Factors Contributing to Clinical Output Among General Practitioners and Family Physicians

University of Saskatchewan

College of Graduate Studies and Research

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ABSTRACT

Objectives. The objective of this project was to ascertain and quantify the effects of gender, age, payment method, and practice size on clinical output of GP/FPs. While the *identification* of these effects has been undertaken previously, this study is the first attempt to quantify the proportion of variance in physician output explained by this group of variables.

Background. The question is of vital importance to academics, health professionals, and citizens. The physician population is aging and feminizing while physicians are softening their opposition to fixed remuneration methods and displaying a greater predilection to group practice. Implications exist for the supply of physician services as gender, age, payment method, and practice size have been found to influence physician output, and therefore the availability of primary care services.

Methods. The study employed self-reported data obtained from 1006 Canadian general and family practitioners in 2004. Respondents provided their gender, age, payment method, and practice size, as well as the number of patient visits they conducted (both during regular hours and while on call) and the number of hours they worked in an average week. These data were used to measure the effects of the four independent variables on GP/FP output and to quantify their total collective affect.

Results. By and large, the analysis confirmed the prevailing view of the literature, as female physicians; physicians in the youngest and oldest age categories; physicians remunerated mainly through fixed payment methods; and physicians in group practice reported lower levels of output than their counterparts. Despite the presence of obvious trends in the data, in some cases the analysis was unable to uncover *statistically significant* differences in output between groups of physicians.

In terms of the contribution made by these four variables to the variance in GP/FP output, significant and parsimonious models contributed 16.2% of the variance in total patient visits, 19.3% of the variance in patient visits during regular hours, 2.5% of the variance in patient visits while on call, 11.1% of variance in hours worked per week, and 8.9% of the variance in patient visits per hour worked.

Conclusion. The four factor variables explained less than one fifth of the variance in all output categories. This first attempt to quantify their contribution identifies an

important question: what accounts for the remaining variance? If the unidentified factors are measurable, perhaps they can be added to these models in the future in order to increase our understanding of the forces behind GP/FP output of primary care services.

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For my parents Dan and Sharon, and my brother Brandon:
my providers of support and motivation;

and for Danielle Rivière, the source of my every inspiration.

1.0 Introduction

The Canadian health care industry exists within an environment of constant change. Persistent technological improvements, evolving societal demands, the continuous reformation of public policy, and the ever transforming makeup and sentiment of the health care workforce coalesce to siege the stability of the industry. Ever present in the minds of health policy analysts, government officials, politicians, and the general public is accessibility to primary care services, and more specifically, access to primary care physicians. The supply of physicians is an issue at the forefront of many health policy debates. How can we guarantee that a physician will be available should we need one? How can we be sure that our children and their children will be afforded that same guarantee?

The study will focus on the clinical output of general practitioners and family physicians, as these professionals are responsible for the delivery of primary care services to the Canadian population and serve as the gatekeepers to the remainder of the health system. In addition, the gatekeeper role renders the process by which a patient receives an appointment to a GP/FP different from the process for an appointment to a specialist; specialist appointments, in Canada, are set usually after a referral has been granted by a GP/FP. It can be argued as well that the service provided by GP/FPs is more homogeneous than the services provided by the entire breadth of specialists; therefore, the focus on GP/FPs eliminates the confusion that might result from the provision of significantly different services.

The study will contribute to the literature by: 1) quantifying the effects of gender, age, payment method and practice size on output of GP/FP clinical services and 2) determining the relative importance of each. The virtue of this line of questioning is in its implications for health human resource policy. If we can identify the factors that influence physician output of patient visits, and determine the affect of each, we should be better able to predict the future supply of physician visits available to the population.

Without this type of inquiry, fully informed decisions regarding physician supply are difficult to make.

The study will test the effect of each output driver on GP/FP clinical output as measured by: the number of patient visits, both during regular hours and while on-call; hours worked; and patients seen per hour worked. The study will employ data that were collected in 2004 through a survey of the Canadian physician population conducted by the Mercuri Group entitled *Emerging Issues in the Work of Physicians*. Initial comparative analyses will be conducted through the use of t-tests and analyses of variance to identify the effect of each potential output driver. Subsequently, single and multivariate modeling will be undertaken to determine the percentage of variance in output that can be explained by the identified output drivers and the relative strength of each independent variable in predicting each type of output.

2.0 Literature Review

The first objective of the literature review is to develop the study's conceptual framework. Subsequently, a scan of the current Canadian physician population will be presented. After the structure of the workforce has been established, physician output is considered – both the ways in which it has been measured, and the factors that seem to hold influence over it.

2.1 Conceptual Framework

From the standpoint of an economist, a visit by a citizen to a GP/FP is characterized as a service rendered by a seller (the physician) to a consumer (the patient). The physical transaction, on the surface, is analogous to any service provided by a firm to a household. Below the surface, however, the context within which Canadian physicians and citizens provide and seek medical treatment differs substantially from typical exchanges.

In a typical marketplace – provided that all of our able economist's assumptions are met – the seller's (for example, a hairdresser's) willingness to provide a good or service differs depending upon the revenue that would be accrued through doing so. Similarly, a customer's willingness to consume these goods or services differs depending upon their *cost* – the financial outlay necessary to procure them. The price at which the seller is willing to provide what the buyer is willing to consume becomes the equilibrium price – the 'going rate' – for the good or service in question. It follows that the quantity exchanged at the equilibrium price is known as the equilibrium quantity.

The market for health care services violates many of our economist's assumptions.[1,2,3] Phenomena which enable a market to operate efficiently, independent of outside intervention such as an absence of barriers to entry and the uniformity of information between buyer and seller, are arguably unmet. Combine these violations with the fact that demand for health services is based, in large part, on *needs* as opposed

to preferences, and the result is significant market failure, as the market is unable to provide health services at the most optimal level.[1] In Canada, as in most other industrialized nations, various levels of government have intervened, imposed regulations, and created insurance systems in an attempt to correct for these market failures. These activities have rendered the market for health care services anything but normal.

The result, in Canada at least, has been to limit the role of demand in the determination of price, and therefore supply. The majority of Canadian general practitioners are paid on a fee-for-service basis – a piece rate for each service rendered. These fees are set through negotiations between provincial governments and physician organizations. A fee is then paid to a physician from taxpayers through the provincial insurance system when a particular treatment is provided to a patient. The patient receives the treatment free of charge, as they have already contributed to the insurance pool through taxation.

Complicating matters is the increasing popularity of alternative payment methods (those other than the fee-for-service method just described). Many physicians are choosing salaried remuneration schemes, contract, and arrangements that combine two or more methods. In no case, however, does a patient pay for medical services out of their own pocket. As such, the consumer's 'buy or go without' decision that would be required in the functioning market has effectively been taken out of the health care equation.

That being said, individual demand for physician services cannot be completely ignored. If the physician to population ratio changes or the evolving *structure* of the population results in changes in the need for health services, the number of patient visits supplied by the individual physician may change. As a result, governments try to anticipate the future demand for physician services. By doing so, they might adjust the number of medical school positions in an attempt to make the future supply of physicians meet the future demand. This quasi-planned market model limits the role of consumer demand in the influence of supply. To the extent that consumer demand is applicable, it is addressed through the government's adjustment of medical school enrolments.

This process creates a necessity for policy makers to anticipate the number of physicians required which, in turn, necessitates the identification of physician output. Physician output, as will be discussed in greater detail later in this text, can be calculated in a variety of ways. The current study will measure physician output in five ways: 1) the total number of patient visits conducted by the physician; 2) the number of patient visits conducted by the physician *during regular hours*; 3) the number of patient visits conducted by the physician *while on call*; 4) the physician's average hours worked per week; and 5) the number of patient visits conducted per hour worked.

One way to calculate GP/FP clinical output is to simply sum this output over the entire GP/FP population, where V_A is the aggregate clinical output of GP/FPs, V_i is the output of the ith individual physician, and N is the total GP/FP population:

$$V_A = \sum_{i=1}^{N} V_i \tag{2.1}$$

Logistically speaking, it is difficult to precisely ascertain the output level of each individual physician. As such, the aggregate supply of GP/FP clinical output can be derived by multiplying the total number of GP/FPs (N) by the *average* output of an individual physician ($\overline{V_i}$) – or an estimate of that amount. The total supply of GP/FP visits (V_A) will result:

$$V_A = N \times \overline{V}_i \tag{2.2}$$

Given the simple mathematics of the equation, both N and $\overline{V_i}$ are positively correlated with V_A. In other words, as one of N or $\overline{V_i}$ increases, so does V_A. If either decreases, V_A follows. If an increase in one is coupled with a corresponding decrease in the other, the effects will offset, either partially or completely.

At any moment in time, this calculation is quite simple, provided that the required information is at hand. Physician counts are available through numerous organizations (the Canadian Medical Association and the Canadian Institute for Health Information to name two), and output figures can be obtained through billing records or through survey data, the latter of which is employed by the current study. But how are N and $\overline{V_i}$ determined?

The number of physicians practicing in Canada (*N*) is influenced to a large extent by public policy. As stated above, the number of physicians present in Canada at any one time is the result of policy with regard to admission to MD training programs. Citizens entering medical school today are likely to become future physicians. As such, the number of seats available in medical school classrooms is a strong predictor of the future physician supply.

Many factors, in addition to the size of medical school classrooms, impact upon the supply of physicians. One major determinant is physician migration. In addition to domestically trained physicians, Canada has a strong contingent of International Medical Graduates (IMGs) practicing within its borders. On the other hand, many domestically trained physicians make the choice each year to relocate to other nations. Physician migration, like migration in all areas, is influenced by a variety of phenomena – from comparative living standards, and perceived opportunity, to a chance for greater income security, geography, and even the weather. While the government by no means has monopolistic influence over all of these variables, a great many are the product of public policy. IMGs, like all new immigrants, are subject to Federal immigration policy. Changes to these immigration policies and to credentialing requirements will affect the ability of IMGs to enter Canada and start practicing medicine. Public policy which impacts the lives of domestic physicians will also hold influence – however large or small – over their desire to remain practicing in Canada, as it would any other member of the population. While it is impossible to pin down the breadth of variables that influence the size of the physician population, public policy is by far the most significant determinant.

Public Policy itself is influenced by a variety of phenomena. As discussed above, governments attempt to predict the future need for physicians and adjust medical school admissions accordingly. Demand for services (at least as it is interpreted by the powers that be) is therefore included in the equation through this process. It is possible that other more political factors play a role in this process, but their inherent unpredictability eliminates them from serious consideration, at least from the point of view of the current study. Therefore:

$$N = f(MDE, IM, EM, \ldots) \tag{2.3}$$

The supply of physicians is a function of medical school enrolments (*MDE*), physician immigration (*IM*), and physician emigration (*EM*). More simply put:

$$N = f(Policy) \tag{2.4}$$

The supply of physicians is a function of public policy. As public policy in these areas changes, the total number of physicians can be expected to change as well.

The literature identifies factors that typically influence the clinical output of an individual physician ($\overline{V_i}$). These include the age (*A*) and gender (*G*) of the physician, the country in which they received their medical training (*MDG*), the method through which they receive payment for their services (*PAY*), and the size of the physician group that they work within (*GRP*). In addition to these tangible characteristics, the literature indicates that broader 'lifestyle preferences' (*LP*) often hold sway over output. Some physicians simply choose to produce different levels of output than their colleagues. Conceptually speaking:

$$\overline{V}_i = f(A, G, MDG, PAY, GRP, LP) \tag{2.5}$$

The average individual output is a function of physician age, gender, medical school of graduation, payment method, group size, and lifestyle preferences. As the status of each of these variables evolves within the overall GP/FP population, a change in $\overline{V_i}$ will result. This change in $\overline{V_i}$, in turn, can be expected to change the aggregate output of physician services. For this reason, a simple physician count (*N*) is insufficient to predict the future availability of GP/FP visits.

To make such a prediction requires that one identify the trends in the variables that influence GP/FP clinical output. If the age structure, the male to female ratio, the international to domestic ratio, the prevalence of the different payment methods, the size of physician groups, or the lifestyle preferences of physicians is expected to change, one would conclude that $\overline{V_i}$ is likely to change as well. This study attempts to address that issue by quantifying the effect of each factor that holds potential influence over $\overline{V_i}$.

The framework presented in this section speaks to the importance of the present line of questioning. To make appropriate decisions regarding physician supply, policy makers must look beyond the aggregate number of physicians. A workforce full of

high-output physicians is different from a workforce made up of physicians whose output is lower. If output influencing characteristics can be identified, their effects quantified, and this information put to use, physician supply decisions will more accurately reflect the society's needs. An attempt will now be made to describe the physician population.

2.2 The Changing Physician Workforce

This section describes the state of the current Canadian physician workforce. Through this description, the current structure of the physician workforce will be explored and the different demographic trends identified. This information is important; as the prevalence of each output influencing characteristic evolves within the physician population, the aggregate supply of physician services will evolve in kind. After the physician workforce is presented, the focus will shift to the output influencing characteristics identified in the literature.

The physician workforce is experiencing the same occurances as the overall Canadian workforce – an aging population, an increase in the proportion of female labourers, and changing lifestyle preferences.[4] In addition to these challenges, the workforce faces hurdles created by physician migration and location, and evolving training requirements.[5]

As discussed, various policy decisions taken on the part of government have dictated the current state of physician supply. As far back as 1964, the Royal Commission on Health Services recommended Canada double the number of medical school enrolments that were then available.[6] By 1976, over 1700 medical degrees were awarded by Canadian medical schools – an increase of over 100% on the number awarded in 1964. The significant expansion in medical school output prompted Justice Emmit Hall, who chaired the aforementioned Royal Commission, to recommend a physician workforce study in 1980, to determine whether or not the supply expansion had gone too far.[6] The workforce study was completed by provincial governments in 1984 and, coupled with the 1991 Barer-Stoddart Report, prompted a reduction in medical school enrolments.[6]

In 2004, there were 60,612 physicians practicing in Canada, an increase of just under 5600 physicians since 1993.[7] A publication written by Chan for the Canadian Institute for Health Information (CIHI) entitled *Perceived Surplus to Perceived Shortage* reports that net physician flow averaged +1,040 per year between 1990 and 1993, but fell to just +313 per year between 1994 and 2000.[5] The report submits a list of factors that were responsible for this decrease in net flow of physicians and their percentage contribution, in decreasing order:[5]

- Increase in the length of time spent in postgraduate training, post 1993 and increase in the number of specialist trainees in relation to general practice trainees – 25%
- Decreased intake of international medical graduates – 22%
- A return to normal rates of enrolment in medical schools, which had uncharacteristically ballooned between 1987 and 1993 – 21%
- Increased retirements – 17%
- Decreased medical school enrolment – 11%
- Loss of physicians to the US and other countries – 3%

Curiously, Chan attributed just 14% of the reduction to decreased medical school enrolments and the loss of physicians to other countries – the two issues which seem to receive the most publicity. The most influential events, on the other hand, seem to fall largely outside the scope of the 1991 Barer-Stoddart report. On the other hand, it is prudent to consider the possibility that the 'uncharacteristic ballooning' of enrolment rates referred to in Chan's third point may not have been uncharacteristic at all. Perhaps the enrolment observed between 1987 and 1993 would have continued if it had not been restricted by decisions taken on the part of policy makers.

Between 1986 and 1994, the physician population grew by 20.5%, while the overall Canadian population grew by just 13.9%, resulting in an increased physician to citizen ratio.[5] The ratio peaked in 1993 at 190.8 physicians per 100,000 people, but dropped between 1993 and 1997, only to increase again steadily into the early part of the new millennium. In 2003, the ratio was 188.7 physicians per 100,000, slightly below the 1993 peak.[5]

In recent years the overall physician to citizen ratio has remained relatively constant and if retirement, graduation, and net migration rates hold steady, the current physician to citizen ratio is expected to persist.[8] While the literature indicates that the physician population has remained constant relative to the civilian population, the changing structure of the two has stretched the capacity of the average physician causing individual physician workloads to increase.[5] In addition, there are demographic and geographic, as well as personal and practice characteristics that drive physician output of patient visits and the propensity to engage in patient care.[9] GP/FP output on the aggregate has changed and will continue to change as the structure of the physician workforce evolves. One must therefore explore the workforce beyond the sum of individual physicians in order to accurately anticipate the supply of physician services into the future.

The physician population is experiencing structural changes on a number of fronts, including age and gender makeup, payment method, practice size, and specialty mix. The female proportion, currently 32% of the total, has been steadily increasing in recent years and is relatively more concentrated in the younger age groups.[4,8,10] In medical school classrooms since 1995, females have comprised 50% or more of the student population.[8] By 2015, it is expected that the female proportion of the overall physician workforce will reach 40%.[8]

In addition to a shift in gender makeup, the workforce is experiencing changes in its age structure. Approximately 44% of the total workforce was 50 years of age or older in 2004 (up from 39% in 1999) and just 24% of Canadian physicians were under 40 years of age (down from 28% in 1999).[10] Of the total female physician population, 72% were below the age of 50, compared to 48% of males.[10] The average age of the total physician workforce was 48.6 – three years older than in 1993[7] – and the number of new entrants to the 'less than 30' age group has fallen steadily since 1999.[10] This trend toward an increasing proportion of aging physicians may result in significant ramifications for policy makers. In addition, historic differences in the work habits of male and female physicians (addressed in detail below) cannot be ignored when one considers that an increasing proportion of younger physicians are female.

Family physicians, on average, are younger than their colleagues who have opted to specialize. This age discrepancy is most certainly due, in part, to the comparatively lengthier training requirements for the specialties. In 2002, the average specialist was 48.8 years of age while the average family practitioner was 46.6 years of age.[11] The gap has narrowed since 1993, when the average specialist was 48.1 and the average GP was 43.3.[11] These figures would suggest that increases in the average age of the overall physician population have been felt mostly within the family practice ranks.

The ratio of specialists to general practice physicians has remained relatively stable over the last decade. Between 1993[12] and 2004,[4] the percentage of specialists increased from 47%[12] to 48%.[4] Compared to their male colleagues, female physicians are more likely to enter family practice and opt against specialization, though as time passes, this is becoming less and less the case. In 1993, of the approximate 13,500 female physicians practicing in Canada, just 36% were specialists;[12] this percentage sat at 41% in 2005.[10] Just over half (50.03%) of male physicians were specialists in 1993,[12] compared with 51.8% in 2005.[10] Of the total specialist population, the female proportion has risen from 19% in 1993[12] to 27% in 2005.[10] This shows clearly that female physicians are displaying an increasing propensity to specialize.

The percentage of physicians practicing in Canada who received their medical degrees abroad has decreased moderately over the last decade. In 1993, these International Medical Graduates comprised 25% of Canada's physician workforce; this percentage had fallen to 23.9% by 2005.[13] This reduction has come about mainly as a result of a reduced dependency on international specialists, as our reliance on IMG family practitioners fell from 23.3% in 1993 to 22.3% in 2002 – just 1% -- while reliance on IMG specialists fell from 27% to 22.8% over the same time period.[13] According to the Canadian Medical Association (CMA), IMGs practicing in Canada tend to be older than their domestically trained counterparts. In 2002, 47% of IMGs were above the age of 55, compared with 29% of all physicians.[10] The same CMA study suggests that, relative to the domestically trained workforce, a smaller proportion of IMGs are female.

Also evolving are the methods through which physicians receive payment for their services. There are three main methods of physician remuneration in Canada: fee-

for-service (FFS), salary, and blended methods.[14] According to the CMA National Physician Survey conducted in 2003, 56.9% of Canadian physicians are paid strictly through fee-for-service. Another 7.6% reported that they are compensated on a salaried basis, and the remaining 32% who offered a response were remunerated through a blended payment method.[10] Comparatively, in 1990, the figures were 67.5%, 9.2%, and 20.8% for FFS, salary, and blended methods respectively.[10] These values represent a clear shift toward alternative payment methods – those other than fee-for-service. In 2003, males were moderately more likely to receive remuneration through fee-for-service (59.1%) than females (52.5%); differences were not as substantial for other methods of payment.[10]

The CMA survey also asked physician to report their *preferred* method of remuneration.[10] Interestingly, 27.1% report a preference for salaried remuneration, compared to 36.5% for FFS. This gap has narrowed significantly since 1995, when preferences were 18.3% and 50.4% respectively. Preference for blended payment has actually decreased from 25.0% to 21.1% over the same time period. Preferences for salaried and FFS remuneration are virtually even among females (30.8% and 29.4% respectively), but males tend to prefer FFS (25.2% and 40.1%). The CMA study also reports an inverse relationship between age and preference for salaried remuneration.

In addition to the changing age and gender structure and the general practice to specialist ratio, the practice settings of Canadian physicians' are also evolving.[8] According to the Physican Human Resource Strategy for Canada Task Force (PHRSCT), 64% of GP/FPs surveyed reported being active in group practices in 1998. The report suggested that this number could be expected to increase as the physician population evolves, stating that younger physicians were placing greater emphasis on a balanced lifestyle and flexible working hours.[8]

In light of this evidence, the Canadian physician workforce is clearly in transition. The changing face of the physician population, as will be shown below, is likely to result in significant implications for the supply of patient visits, even if the physician to citizen ratio remains constant. The discussion now turns toward physician output and the characteristics which increase and decrease physician propensity to see

patients.

2.3 Output Measurement Tools

Physician productivity can be measured in a number of different ways. A discussion paper released by the American Academy of Family Physicians (AAFP) identifies several traditional methods used to measure physician productivity.[15] One of the traditional measures is a simple observation of workload, either through the sum of office visits by patients, or a count of hours worked. By determining the number of patients a physician tends to over a given period of time, or the number of hours he or she works, one can make inferences about productivity relative to the rest of the workforce. One study that employed this method of analysis was that conducted by Sloan in 1975, entitled *Physician Supply Behaviour in the Short Run.*[16]

A common limitation to these traditional measures of productivity is their inability to take into account differences in difficulty associated with different types of physician activities. By tracking only the number of patients a physician sees, one is not able to measure the amount of effort devoted to each specific case. Likewise, the sum of a physician's work hours over a given time period is not sufficient information to measure the effort expended.[15,8]

In order to combat these limitations, some studies have employed the use of Relative Value Units (RVUs)[15,17] – factors which apply additional weight to more complex medical procedures – in their output calculations. This convention spawned the development of the Resource Based Relative Value Scale (RBRVS) in the United States. The RBRVS provides weightings for each physician service based on their relative requirement for: time; technical skill and physical effort; mental effort and judgment; and psychological stress. The RBRVS has been employed by the American Medicare system and other American third party payment organizations to measure physician productivity.[17]

The *Canada's Physician Workforce* report released in 2005 by the Physician Human Resource Strategy for Canada Task Force suggests that while a direct physician headcount is important when calculating administrative and overhead costs, physician Full Time Equivalents (FTEs), which attempt to account for practice intensity, are a

better measure of physician supply.[8] An FTE measurement creates a single value for an individual physician and reports his or her workload in relation to what is considered a 'full load.'

Given the methodology used to calculate FTEs, the total number of physician FTEs would equal the total number of physicians if all physicians measured were working 'full loads.' A physician with an FTE measurement equal to 1.0 has a workload exactly equal to what is considered a maximized practice. A physician with a lower FTE is working a lighter load, and a physician with an FTE *above* 1.0 has a workload greater than a 'full load'. The sum of all individual FTE measures yields the total number of physician FTEs in the region. According to the Canadian Institute for Health Information, Canada had 44,234 FTEs in 2003, an average of 0.84 FTE per physician.[5]

Another method identified in the AAFP paper and employed in the literature is dollars generated by a physician practice.[15] For physicians remunerated through fee-for-service in Canada, measurement through this method is relatively simple. The Canadian Institute for Health Information combines this method with the use of FTEs to measure physician productivity in its 2001 report *The Practicing Physician Community in Canada*.[9] One drawback to this bill submission method is the difficulty in measuring workload for physicians remunerated through alternative payment arrangements.[8] Salaried physicians, for instance, do not submit claims that can be conveniently tracked. Physicians who receive payment through fee-for-service and additional payment through another method (a blended arrangement) will also be misrepresented by a straight count of fee-for-service billing.

One of the main issues concerning the present study is the need to capture the entire physician population. Many of the billing and FTE methods presented above limit the ability to include physicians remunerated through alternative payment methods. As such, the present study employs the use of questionnaire data, obtained directly from Canadian physicians. The specifics of the data source, as well as the limitations to this methodology are discussed in later sections.

In the following discussion of physician productivity drivers, all of the literature cited employs a variation of one of these productivity measures. Given that each

measure is able to reflect physician productivity, the specific method used is not overly important when identifying drivers. What *is* important are the characteristics that are identified as being influential in determining physician productivity.

2.4 Output Drivers

The literature identifies seven broad factors that may influence physicians' output of patient visits: specialization;[5,9] gender;[5, 8, 9, 10, 15, 18] age;[5, 8, 9, 10, 15, 18] remuneration method;[5, 8, 9, 10, 15, 18] practice setting;[8, 15, 19] medical school of graduation;[5, 8, 9] and other less tangible lifestyle preferences.[8] In this section, an attempt will be made to identify specific characteristics presented in the literature that may influence physician productivity and report the relevant trends in the physician population associated with each driver.

Specialty. In many respects, physician productivity can only be effectively discussed by separating physicians by their broad specialization category. Medical specialists, clinical specialists, and family practice physicians engage in different types of activity. CIHI's 2001 *Practicing Physician Community in Canada* reports that surgical specialists display the highest activity ratios, followed by medical specialists and then primary care physicians.[9] Specialists are working longer hours on patient care and providing more services than they were in the 1980s, whereas family physicians are not. [9, 10] As such, it is impractical to assess physician productivity on a workforce-wide basis. Original statistical analysis conducted within the present study will focus on the gatekeepers to the Canadian health system – General and Family Practice physicians.

Age. The literature suggests, overwhelmingly, that a change in the age structure of the physician population will create significant future implications for the aggregate output of patient visits.[5] As physicians grow older, their productivity increases to a point, after which it begins to decrease. In 2001, Chan suggested that workload amongst fee-for-service physicians is highest within the 50 – 59 age group, followed closely by the 40 – 49 age group.[5] Output for older and younger physicians is less, to a statistically significant degree.[5] A 2003 study conducted by the CMA corroborates this curvilinear relationship between age and output. Although age groupings were reported differently,

the CMA study suggested physicians between the ages of 45 and 65 worked, on average, a greater number of hours per week than their colleagues in other age groups.[10]

The JANUS report published by the College of Family Physicians of Canada reported an average workload of 102.27 patients per week (excluding patients seen during on-call hours) for physicians in the 55 – 64 age group; the highest workload for any age group.[18] Patient load increased with age, peaking at the 55 – 64 group, and then falling off considerably for physicians 65 years of age and older.[18] The American Academy of Family Physicians gives further weight to these findings, reasoning that perhaps as physicians age beyond the most productive group they devote less time toward direct patient care and spend more time on each individual patient that they do encounter.[15]

Perhaps one explanation for relatively lighter workloads amongst younger physicians is the higher prevalence of female physicians – who tend to have relatively lighter workloads – in the younger age groups.[9, 10] Another potential explanation is changing physician lifestyle preferences.[8] Both gender and lifestyle issues are discussed in greater detail below.

As the structure of the physician population evolves, the resulting changes in aggregate physician productivity will have significant impact on overall output of physician services. A large proportion (54%) of the physician population is currently situated between the ages of 30 and 50.[4] The aging of this cohort into the future may create upward pressure on aggregate physician productivity as physicians from the younger age groups enter the highly productive 50 – 60 group. This is, however, contingent upon this cohort adopting the work habits of the current physicians who occupy the 50 – 60 age group, which may not necessarily be the case.[8]

Once the majority of physicians surpass the 50 – 59 age group, productivity within this cohort will decrease substantially if current tendencies continue. Complicating matters further, the aging physician workforce is expected to result in an increase in the number of physician retirements each year. According to the Physician Human Resource Strategy Task Force (PHRST) report entitled *Physician Workforce in Canada*, physicians working in the hospital system tend to retire at age 70.[8] While this

is significantly later in life than the national average (62), PHRST reports that retirement age is decreasing as more physicians opt for early retirement.[8]

The aging physician population might result in increased output of patient visits in the immediate future, if physicians moving into the most productive age groups adopt the practice patterns of those who went before them. The curvilinear relationship between age and patient visit output will eventually cause output to decline, however, as the bulk of the workforce moves past their most productive years. This decline, combined with an increasing rate of retirement – also a product of the aging workforce – may substantially reduce physician output on the aggregate. Forecasts such as these, however, assume that current trends and workload patterns will continue into the future. In reality, there exist some factors that may influence trends in these variables. These are discussed below.

Gender. As suggested previously, the structure of the Canadian physician population with regards to gender is evolving. Historically, the careers of female physicians have significantly differed from those of their male counterparts.[20, 21, 22, 23, 24] As Rhonda Birenbaum submits, "from practice patterns to practice structure, from specialist availability to service mix, from billing characteristics to public expectations, it seems female doctors just do things differently from their male colleagues."[21] A Dutch study conducted between 1982 and 2001 and published in 2005 by Mayorova et al suggests that male propensity to become a general practitioner significantly decreased over the period of the study. They added that female physicians, more likely to become general practitioners, are also more inclined to opt for a group practice setting than their male counterparts.[22] A 2003 American study reported conflicting results, suggesting that the practice patterns of male and female physicians were generally similar.[25]

A 2002 Australian study conducted by Kilmartin et al reported that the key issues for women in medical practice included: job satisfaction; life balance between personal and work life; autonomy; availability of flexible work and training; affordability of professional expenses; fair remuneration; and obtaining influence. The study suggested that societal demands have not kept up with the evolution of the physician workforce – women are still expected to fill the role of 'homemaker' while at the same time fulfilling the same duties in their professional lives as men.[26]

One common theme throughout the literature more specific to the current study is the tendency shown by female physicians to spend more time on individual patients, but see fewer patients overall.[5, 9, 10, 27] Chan reported in 2003 that in all age groups, across all three broad specializations, female physicians, on average, work fewer hours per week than their male counterparts.[5] The 2005 version of the JANUS survey released by the College of Family Physicians of Canada supports the CMA release, reporting that female physicians work fewer hours on direct patient care per week (30.5 to 35.9) and see fewer patients (82.49 to 102.82) than their male counterparts. Total hours worked (direct patient care plus indirect patient care, teaching, research, etc) were 53.1 for males and 46.2 for females.[18] The results of these two reports are further supported by the *Practicing Physician Community in Canada* publication released by the Canadian Institute for Health Information in 2001, which reported that the activity ratio for females was about 80% of that for male physicians.[9]

It appears that the changing structure of the population with regard to gender will have an effect on aggregate output, opposite to the initial effects of aging. As stated in the opening subsection to this chapter, female representation in the physician workforce is increasing relative to the overall workforce. As identified in the literature, female physicians, particularly those in the youngest age groups where the greatest influx will be felt, tend to work substantially fewer hours and see fewer patients than their male colleagues. This 'feminization' of the physician workforce, as it has been dubbed, will create downward pressure on aggregate supply of physician services.

Medical School. The practice patterns of International Medical Graduates in Canada are understudied. However, as reported above, we know Canada's reliance on international physicians – at least as far as reliance can be measured by their presence – is decreasing.[12] Furthermore, the IMG proportion of the workforce is older than the rest of the physician population and can be expected to have a greater rate of retirement.[8] With regard to output, a 2001 CIHI study reports physicians who graduated from medical schools outside of North America have higher workload ratios than those who received their MD from Canadian and American medical schools.[9] If Canada's reliance on international medical graduates continues to decrease, CIHI suggests, a 10% drop in

physician activity and output can be expected, *ceteris paribus*, when the current cohort of international physicians retires.[5]

Payment Method. The method through which a physician is remunerated can significantly influence productivity.[5,8, 9, 10, 15, 18] Under a fee-for-service payment model, a clear financial incentive exists for a physician to be as productive as possible, in terms of patient throughput. The more patients a fee-for-service physician sees, the greater the number of claims submitted to the provincial insurer. On the other hand, a salaried physician is not presented with the same financial incentive, given the stability of the payment received over prescribed periodic intervals. This discrepancy in incentives creates very real implications for output of patient visits.

Leitch and Walker, in their 1999 paper *The Basics of Physician Compensation*, cite this 'risk of inadequate level of service' as one of the weaknesses of the salaried remuneration method.[28] Xu and Yu confirm this weakness, submitting that the "service volume provided by salaried physicians is consistently lower than that by FFS physicians."[29] These claims are supported in a discussion paper prepared for the 2002 Romanow Commission by Grignon et al.[14] As such, the trend toward alternative methods of remuneration (as submitted previously) – many of which contain a salaried component – may result, *ceteris paribus*, in decreased overall physician productivity on the aggregate.

Practice Setting. The American Academy of Family Physicians, in their *Physician Productivity Discussion Paper* report that characteristics of the practice in which the physician works may affect overall productivity.[15] In particular, they suggest, the mission and vision of the organization, as well of the size of the practice may have some influence on output.[15] One of the earliest studies of physician productivity was that conducted by Reinhardt in 1975 entitled *A Production Function for Physician Services.*[19] Through his research, the author found that physicians in single specialty groups oversaw between 4.5 and 5.1 percent more patient visits and produced about 5.6% more billings than their solo practice counterparts.[19]

The PHRST identifies a trend away from solo practice toward group practices.[8] Specifically, younger physicians and females are choosing group practices at greater rates. Perhaps in contradiction to Reinhardt's assertion, Hale suggests the move toward

group practice is an attempt to achieve a more balanced lifestyle, implying a higher rate of output for solo practitioner.[30] This logic is supported by the College of Family Physicians of Canada, who suggest younger family doctors are choosing group practice because their obligations are limited to their shift.[31] This trend has led to an increase in the number of physicians working in walk-in clinics. The move toward group practices may result in a change to the effective supply of physician services, if indeed physicians in group practice have different workloads. The increased popularity of group practice, PHRST suggests, can be partially contributed to changing lifestyle preferences amongst physicians.[8]

Lifestyle Preferences. The driver that interweaves all of those previously listed is the changing lifestyle preferences of the physician population. While the potential affect of each previous driver has been espoused, the anticipated effects of each driver have been forecasted under the assumption of *ceteris paribus* – that is, that all other variables would remain constant. Changing lifestyle preferences may significantly alter the trends in each driver, threatening this assumption, and causing their effective impact to deviate from that predicted.[8]

Data suggests physicians, especially younger physicians, are opting for more balanced lifestyles.[8] As mentioned above, younger physicians are more likely to prefer salaried remuneration, which offers income stability.[8,10] Younger physicians also seem to work fewer hours, and prefer greater predictability.[5,8,10] The trend toward group practice may also be attributable to changing lifestyle preferences, as physicians seek a way to more effectively distribute their workloads and allow greater flexibility. It is difficult to precisely predict the effect that these changing lifestyle preferences will have on aggregate physician productivity, but it would appear as though the most prevalent changes will place downward pressure on the output of physician services.

2.5 External Considerations

As much as extraneous factors have influenced physician output and supply, we can count on them to continue to do so. It can be expected, for instance, that governments, having kept a wary eye on the evolving structure of the physician workforce, will take action to combat the impending shortage in the supply of

physicians – indeed they already have. There have been recent calls for increases to medical school admissions from governments, professional organizations, and medical schools.[32] Some regions of the country have already responded by increasing enrolments.[33] Therefore, when anticipating the output of patient visits for Canada's future General and Family practitioner population, it is imperative to factor in any foreseeable relevant public policy shifts pertaining to physician supply.

Virtually any study with health policy implications would be remiss not to include a brief discussion of the public-private debate. With regard to the supply of patient visits, some suggest the introduction of a second private tier, in addition to the current publicly funded health system, would 'free-up' room within the latter.[34] In reality, access to health care depends a great deal upon the supply of *physician* services. As discussed above, physician output of patient visits is driven by two broad factors: 1) the size and structure of the physician population, and 2) the presence of output inducing characteristics *within* the population. In order to positively impact upon waiting times by creating space within the public system, such a shift in policy would have to lead to either: 1) an increase in the size of the physician population (*N*); or 2) an increase in the prevalence of output inducing characteristics which would increase the average physician output ($\overline{V_i}$).

As discussed previously, a review of the literature identified several characteristics which appear to influence physician output, including gender, age, payment method, and group size. It is difficult to fathom how privatization would influence the gender, age, payment, or group structure of the physician population in such a way as to cause an increase in $\overline{V_i}$. As a result, any *immediate* increase in the aggregate output of patient visits would have to arise from an increase in the total supply of physicians (*N*-private + *N*-public). The proponents of privatization are silent on how the introduction of the second tier will lead to this necessary increase in the number of physicians disproportionate to the increase in the Canadian population.

Another widely debated issue on the Canadian health care landscape is primary care reform. As manifest in Canadian health care, this process seeks to revamp the way that primary care services are delivered within the country. Support for the general concept is more or less universal; however, the same cannot be said for the process or

blueprint for a new system. The debate is comprised of two schools of thought: the professional and the community model.[35] The former advocates an integrated approach to health care through which the physician remains primarily responsible for the provision of health services. The community vision is broader in scope, placing emphasis on the overall well-being of the population and reducing physicians to just one aspect of health care.[35]

As the point of first contact, general and family practitioners currently serve as gatekeepers to the rest of the health system. Depending on which vision prevails, primary care reform threatens to move control over patient referral from the physician to other health professionals, resulting in significant implications for physician output. If the physician's role as gatekeeper is diminished, patients need no longer report to physicians for first contact to the system. As such, output as measured by patient visits may drastically decline.

While it is important to acknowledge the issues and future policy changes that have the potential to alter the primary care landscape and through it the supply of physician services, the focus of this study is on the characteristics that influence GP/FP output of physician services within the *current* healthcare context. However, the discussion will address any implications that may arise from the interaction between this study's results and potential policy changes.

3.0 Methods

3.1 Objectives

The primary objective of this study is to identify the factors that influence physician output of services as measured by: their patient visits during regular hours, on-call hours, and total hours; the number of hours they work; and the number of patients they see per hour. The study also seeks to quantify the combined effect of these 'drivers' on physician output through regression techniques.

3.2 Data Source

Study data were extracted from the *Emerging Issues in the Work of Physicians* study conducted by the MERCURI Group – of which the author is a member – at the University of Saskatchewan in 2004. Comprehensive questionnaires (Appendix A) containing sections on: quality of health services; health policy issues; professional equity; time spent on activities; stress and management of stress; organization of practice; career satisfaction (including satisfaction with performance) and demographics, were sent to a sample of 5300 physicians across Canada.

The study sample was stratified to over-represent female physicians as well as physicians practicing in smaller communities, and in less populous provinces. Of the respondents, 149 were ineligible for a variety of reasons including: retirement, limited involvement in clinical care, maternity leave, return to medical school, serious illness, or death. In addition, 193 had moved, resulting in an eligible study population of 4958. Of these, 2810 returned questionnaires with very few missing values (56.7% response). The present study focuses on the data received from 1006 General Practice and Family Practice physicians. As such, respondents from all other specialties were excluded.

A one page survey was sent to the 2148 non-responding members of the sample in order to test for response bias. This non-response survey contained key items from the original questionnaire and was returned by 686 of the physicians who received it.

Non-response bias was not detected on the basis of: 1) support for the Canadian health system; 2) authority to make clinical decisions; 3) location; 4) specialty; 5) language; or 6) gender. Non-responding physicians were slightly more satisfied with their career than responding physicians. Adjustments for bias were not deemed necessary.

3.3 Stratification

The sample over-represented females in order to balance the response rate. The study received 528 responses from female GP/FPs and 478 responses from their male colleagues for a total of 1006 responses. This 52.5% to 47.5% female to male split does not reflect the reported 35% to 65% female to male split in the actual GP/FP population. The stratification will not affect differences in output measures for the direct comparison between males and females. Since gender was found to influence output, tests for the effects of other independent variables on output would have been distorted. As such, the effects of the other variables on output will be tested separately for males and females. The other factors by which the sample was stratified were expected to have a negligible effect on reported patient visits. As such, adjustment of the sample based on other variables was deemed unnecessary.

3.4 Measures

3.4.1 Dependent Variables

Patient Visits

Recipients of the *Emerging Issues in the Work of Physicians* questionnaire were asked to report the number of patients they saw during an average week, during both regular hours and hours on call. These responses were used as two separate dependent variables: 1) patient visits per week during regular hours; and 2) patient visits per week during on-call hours. In addition, a third patient load variable was created by summing the two to yield total patient visits per week (the sum of 1 & 2).

Hours Worked

Respondents to the questionnaire were also asked to report the number of hours they worked in an average week, excluding on call hours. Responses to this question were used as a dependent variable.

Patients Per Hour

The final dependent variable was computed by dividing the reported regular patient visits per week by the reported hours worked per week. The numerator must be the regular hours measure, because the denominator excludes on call hours worked.

Collectively, this contingent of dependent variables reaches a broad array of output categories. The three 'volume' measures – total patient visits per week, patient visits per week during regular hours, and patient visits per week during on call – provide a measure of the overall output of actual patient visits and measure access to a GP/FP on a level that is important to the population as a whole. The remaining measures – hours worked per week and patients per hour worked – provide insight into how physicians are using their time.

3.4.2 Independent Variables

Gender

Questionnaire recipients were asked to report their gender; male or female. This binary variable was used to compare male and female scores on the five dependent variables during the comparative analysis procedures. Much has been made of the distinction between sex and gender. Respondents were asked to report their gender, as opposed to their sex. Given the frequent usage of the former in common dialogue, it is reasonable to assume that the vast majority of respondents would not have altered their answers had the question been alternatively posed. It is also reasonable to assume a high degree of co-linearity between gender and sex.

Age

Respondents to the questionnaire were also asked to report their age in raw numerical terms. These values were used to group physicians according to prescribed age categories for the purposes of the one way analysis of variance procedure. The study employed the groupings used by the Canadian Medical Association in their reporting of physician supply. The groupings are as follows: less than 35 years of age; between 35 and 44 years of age (inclusive); between 45 and 54 years of age (inclusive); between 55 and 64 years of age (inclusive); and 65 years of age or older. For the

purposes of the regression techniques, the raw scores were employed as a continuous variable and applied to the model.

Payment Method

Respondents were asked to report the percentage of their remuneration derived from various methods: 1) fee-for-service; 2) salary; 3) capitated rate per patient; 4) sessional; 5) other. This information was used to create two independent measures of payment method. For the purposes of the comparative analyses, a three level variable grouped responding physicians as follows: 1) > 80% fee-for-service remuneration; 2) 20% - 80% fee-for-service remuneration; 3) < 20% fee-for-service remuneration. The literature suggests a clear difference in patient loads between physicians remunerated mostly through fee-for-service payments and those remunerated mostly through alternative methods. It was not abundantly clear, however, what affect the heavily blended methods (the middle group) would have on output. As such, this three level variable was created to separate the extremes from the blended middle group, and isolate the effects of each. For the purposes of the regression analysis, the percent fee-for-service variable (the raw data collected from the questionnaire) was simply entered into the model as a continuous variable.

Practice Size

The final independent variable was also obtained from the survey data. Respondents were asked to report the number of physicians that work in their main practice setting. The literature identifies flexibility in work schedule as a possible reason for the influence of practice size on physician output. As such, responses to this question were used to split the sample into five categories: 1) solo practitioners; 2) physicians with 1 partner; 3) physicians with 2 partners; 4) physicians with 3 partners; and 5) physicians with 4 or more partners.

3.5 Procedures

Broadly speaking, two types of statistical techniques were carried out within this study. The first was a series of one way comparisons – either t-tests or analyses of variance (ANOVA) procedures – that compared physician output on the basis of the independent variables described above. The one way techniques demonstrated the effect

that each individual independent variable has on the output of physician services as measured by the dependent variables.

The second type of analysis consisted of regression techniques. These procedures were used to estimate the combined effect of all of the independent variables on the five output measures. The regression analyses were used to produce a series of r^2 values that indicated the 'percentage of variance' explained by the combined effects of the independent variables. In addition to the r^2 values, the regression procedures also produced standardized beta values, with which the strength of the relationships between the dependent and independent variables could be compared. The two techniques, in the context of the current study, are described below in more detail.

3.5.1 Comparative Analyses

Each comparative procedure focused on the relationship between the dependent variables and one of the independent variables. As described in section 3.4, the independent variables were split into different levels (gender, for example, into male and female; group size into solo, 2, 3, 4, and 5+). The independent sample t-test was used to compare mean scores between two independent samples. With respect to the current study the t-test was the appropriate test to compare output scores on the basis of gender, as gender has two distinct categories – male and female. The test statistic employed in this comparison is as follows:

$$t = \frac{(\overline{X_1} - \overline{X_2}) - (\mu_1 - \mu_2)}{\sqrt{S_p^2(\frac{1}{n_1} + \frac{1}{n_2})}} \qquad (3.1)$$

Where:

$\overline{X_1}$ = mean of sample taken from population 1 (females)
$\overline{X_2}$ = mean of sample taken from population 2 (males)
S_p^2 = pooled variance
n_1 = size of sample taken from population 1 (females)
n_2 = size of sample taken from population 2 (males)

The t-test just described was not appropriate to compare variables with three or more parameters. The independent variables employed by the current study, in addition to gender (age, payment method, and practice size), consist of more than two parameters. Comparisons for these independent variables required ANOVA, which, through an analysis of the variation in the data, both within and between the groups, allows the researcher to reach conclusions about possible differences. The test statistic for the analyses of variance is the F-test:

$$F = \frac{MSA}{MSW} \tag{3.2}$$

Where MSA is the mean square among groups and MSW is the mean square within groups. The analyses of variance procedures demonstrated whether or not differences in means existed. These procedures also allowed the researcher to conduct post hoc analyses in order to determine exactly which groups differ from one another. This study employed the Scheffe post hoc analysis where ANOVA identified differences.

For the purposes of this study, a significance level (or p-value) of 0.05 was employed. The p-value presents the probability that observed differences are a product of chance. If a relationship has a p-value of 0.05, the likelihood that the observed difference is a product of chance is just 5% - 5 out of 100. The smaller the p-value, the less likely it is that an observed difference is the result of chance. If a relationship has a p-value greater than 0.05 it was rejected, as the probability of chance was considered too high.

The t-test to compare males to females was the only procedure that employed the entire sample. As stated earlier, the sample was stratified to over-represent females. This means that the ratio of male to female physicians within the sample exceeded that same ratio for the actual GP/FP population. For comparisons between the genders, this did not distort the statistical outcomes, but for comparisons on the basis of other independent variables, ANOVA was conducted separately for males and females, since the over-representation of females could have skewed the results. In total, 30 ANOVAS and 5 t-tests were performed:

Table 3.5a – Comparative Analyses Conducted

Independent Variable	Test	Dependent Variables
Gender: Males vs. Females	t-test	Patients per Week During Regular Hours Patients per Week During On Call Hours Total Patients per Week Total Hours per Week Patients per Hour
Age – Female: <35 vs. 35-44 vs. 45-54 vs. 55-65 vs. 65+	ANOVA (F-test)	Patients per Week During Regular Hours Patients per Week During On Call Hours Total Patients per Week Total Hours per Week Patients per Hour
Payment Method – Female: < 20% FFS vs. 20-80% FFS vs. > 80% FFS	ANOVA (F-test)	Patients per Week During Regular Hours Patients per Week During On Call Hours Total Patients per Week Total Hours per Week Patients per Hour
Practice Size – Female: Solo vs. One vs. Two vs. Three vs. Four vs. Five +	ANOVA (F-test)	Patients per Week During Regular Hours Patients per Week During On Call Hours Total Patients per Week Total Hours per Week Patients per Hour
Age – Male: <35 vs. 35-44 vs. 45-54 vs. 55-65 vs. 65+	ANOVA (F-test)	Patients per Week During Regular Hours Patients per Week During On Call Hours Total Patients per Week Total Hours per Week Patients per Hour
Payment Method – Male: < 20% FFS vs. 20-80% FFS vs. > 80% FFS	ANOVA (F-test)	Patients per Week During Regular Hours Patients per Week During On Call Hours Total Patients per Week Total Hours per Week Patients per Hour
Practice Size – Male: Solo vs. One vs. Two vs. Three vs. Four vs. Five +	ANOVA (F-test)	Patients per Week During Regular Hours Patients per Week During On Call Hours Total Patients per Week Total Hours per Week Patients per Hour

3.5.2 Regression Procedures – A Model for GP/FP Output

The results of the one way procedures described above will indicate whether or not differences in output measures exist on the basis of the characteristics identified in the literature and will either support or contradict the claims made *within* that literature. These procedures, however, are not sufficient to *quantify* the total combined influence that those independent variables have on the output of physician services. An attempt to address this question will be made through statistical model building - statistically, how much of the variance in the five output measures can be explained by the independent variables identified in the literature and measured on the *Emerging Issues in the Work of Physicians* questionnaire? To what extent do these characteristics contribute to

determining the number of patients a GP/FP will see and the number of hours a GP/FP will work?

Specifically, regression procedures will identify two important phenomena: 1) r^2 values (correlation coefficients) for all of the relationships tested, and 2) regression coefficients (*b* and β). When an output measure (i.e., total patient visits per week) is regressed against an independent variable (i.e., age) the resulting r^2 value indicates the percentage of variance in the dependent variable explained by the independent variable. In other words, of all the factors that explain differences in physician output, what percentage does gender account for?

The *b* value that results from the regression procedure indicates the intercept of the relationship between the output variable and the independent output driver. β provides the slope – or *strength* – of the relationship between the dependent and independent variables. The standardized β values enable the researcher to compare the effects of different independent variables (gender, age, payment method, and practice size) on the dependent (output) variables. Close attention will be paid to r^2 and β values in the analysis that follows.

3.6 Hypotheses

3.6.1 One Way Comparisons of GP/FP Output

The following section presents the hypotheses associated with each of the one-way analysis of variance procedures described above. It is structured in terms of each independent variable, providing both the null hypothesis (the assumption that the independent variable will not significantly affect the dependent variable) and the alternative hypothesis. For the sake of simplicity, only one null and one alternative hypothesis are presented for each independent variable – the effect of that variable on the general concept of physician output. As described above, however, this study employs five measures of physician output. For each hypothesis, five tests will be made – one for each of the five dependent variables: 1) total patient visits per week; 2) patient visits per week during regular hours; 3) patient visits per week during on call hours; 4) hours worked per week; 5) patient visits per hour worked.

Definition of Terms

Let H_0 = the null hypothesis → there will be no difference between groups

Let H_A = the alternative hypothesis → based on the literature presented above

Let μ = mean

Let i = the ith output measure (i = 1, 2, 3, 4, 5)

Let output measure #1 = Total Patient Visits Per Week

Let output measure #2 = Patient Visits Per Week During Regular Hours

Let output measure #3 = Patient Visits Per Week During On Call Hours

Let output measure #4 = Hours Worked Per Week

Let output measure #5 = Patient Visits Per Hour Worked

One Way Hypotheses

1. ***The Effect of Gender on Output of GP/FP Services***

   $H_{0\text{-}1}$: $\mu_{i\text{-male}} = \mu_{i\text{-female}}$: mean output for male GP/FPs will not differ from mean output for female GP/FPs.

   $H_{A\text{-}1}$: $\mu_{i\text{-male}} \neq \mu_{i\text{-female}}$: mean output for male GP/FPs will differ from mean output for female GP/FPs.

2. ***The Effect of Age on Output of Physician Services – Females***

   $H_{0\text{-}2}$: $\mu_{i\text{-}<35} = \mu_{i\text{-}35\text{-}44} = \mu_{i\text{-}45\text{-}54} = \mu_{i\text{-}55\text{-}64} = \mu_{i\text{-}65+}$: mean output for female GP/FPs will not differ on the basis of age.

   $H_{A\text{-}2}$: Not all μ are equal: mean output for female GP/FPs will differ on the basis of age.

3. ***The Effect of Age on Output of Physician Services – Males***

   $H_{0\text{-}3}$: $\mu_{i\text{-}<35} = \mu_{i\text{-}35\text{-}44} = \mu_{i\text{-}45\text{-}54} = \mu_{i\text{-}55\text{-}64} = \mu_{i\text{-}65+}$: mean output for male GP/FPs will not differ on the basis of age.

   $H_{A\text{-}3}$: Not all μ are equal: mean output for male GP/FPs will differ on the basis of age.

4. ***The Effect of Payment Method on Output of Physician Services – Females***

   $H_{0\text{-}4}$: $\mu_{i\text{-}<20\%FFS} = \mu_{i\text{-}20\text{-}80\%FFS} = \mu_{i\text{-}>80\%FFS}$: mean output for female GP/FPs will not differ on the basis of payment method.

$H_{A\text{-}4}$: Not all μ are equal: mean output for female GP/FPs will differ on the basis of payment method.

5. ***The Effect of Payment Method on Output of Physician Services – Males***

   $H_{0\text{-}5}$: $\mu_{i\text{-}<20\%FFS} = \mu_{i\text{-}20\text{-}80\%FFS} = \mu_{i\text{-}>80\%FFS}$: mean output for male GP/FPs will not differ on the basis of payment method.

   $H_{A\text{-}5}$: Not all μ are equal: mean output for male GP/FPs will differ on the basis of payment method.

6. ***The Effect of Practice Size on Output of Physician Services - Females***

   $H_{0\text{-}6}$: $\mu_{i\text{-}Solo} = \mu_{i\text{-}2} = \mu_{i\text{-}3} = \mu_{i\text{-}4} = \mu_{i\text{-}5+}$: mean output for female GP/FPs will not differ on the basis of group size.

   $H_{A\text{-}6}$: Not all μ are equal: mean output for female GP/FPs will differ on the basis of group size.

7. ***The Effect of Practice Size on Output of Physician Services – Males***

   $H_{0\text{-}7}$: $\mu_{i\text{-}Solo} = \mu_{i\text{-}2} = \mu_{i\text{-}3} = \mu_{i\text{-}4} = \mu_{i\text{-}5+}$: mean output for female GP/FPs will not differ on the basis of group size.

   $H_{A\text{-}7}$: Not all μ are equal: mean output for male GP/FPs will differ on the basis of group size.

3.6.2 Regression Techniques

The section of the analysis involving regression techniques, as described above, will attempt to determine the contribution of the dependent variables – gender, age, payment method, and practice size - in explaining the dependent variable – output. Prior to loading all of the independent variables into one regression model, each will be tested against the dependent variable on its own.

Regression Hypotheses

1. ***The Contribution of Gender***

   Regression equation #1 → $Y = \beta_0 + \beta_1 Gender$; where Y will equal all of: total patient visits per week; patient visits per week during regular hours; patient visits per week during on call hours; hours worked per week; and patient visits per hour.

$H_{0\text{-}1}$: $B_1 = 0$: Gender will not significantly contribute to the explanation of variance in output.

$H_{A\text{-}1}$: $B_1 \neq 0$: Gender will significantly contribute to the explanation of variance in output.

2. ***The Contribution of Age***

Regression equation #2 → $Y = \beta_0 + \beta_1 Age$; where Y will equal all of: total patient visits per week; patient visits per week during regular hours; patient visits per week during on call hours; hours worked per week; and patient visits per hour.

$H_{0\text{-}2}$: $B_1 = 0$: Age will not significantly contribute to the explanation of variance in output.

$H_{A\text{-}2}$: $B_1 \neq 0$: Age will significantly contribute to the explanation of variance in output.

3. ***The Contribution of Payment Method***

Regression equation #3 → $Y = \beta_0 + \beta_1 Pay$; where Y will equal all of: total patient visits per week; patient visits per week during regular hours; patient visits per week during on call hours; hours worked per week; and patient visits per hour.

$H_{0\text{-}3}$: $B_1 = 0$: Payment Method will not significantly contribute to the explanation of variance in output.

$H_{A\text{-}3}$: $B_1 \neq 0$: Payment Method will significantly contribute to the explanation of variance in output.

4. ***The Contribution of Practice Size***

Regression equation #4 → $Y = \beta_0 + \beta_1 PSize$; where Y will equal all of: total patient visits per week; patient visits per week during regular hours; patient visits per week during on call hours; hours worked per week; and patient visits per hour.

$H_{0\text{-}4}$: $B_1 = 0$: Practice Size will not significantly contribute to the explanation of variance in output.

$H_{A\text{-}4}$: $B_1 \neq 0$: Practice Size will significantly contribute to the explanation of variance in output.

5. ***The Combined Contribution of the Independent Variables***

Regression equation #5 → $Y = \beta_0 + \beta_1 Gender + \beta_2 Age + \beta_3 Pay + \beta_4 PSize$; where Y will equal all of: total patient visits per week; patient visits per week during regular

hours; patient visits per week during on call hours; hours worked per week; and patient visits per hour.

$H_{0\text{-}5}$: $B_1 = B_2 = B_3 = B_4 = 0$: The combined effect of the independent variables gender, age, payment method, and practice size will not significantly contribute to the explanation of variance in output.

$H_{A\text{-}5}$: At least one $B_i \neq 0$ (i=1,2,3,4): The independent variables gender, age, payment method, and practice size will significantly contribute to the explanation of variance in the dependent variable output.

After testing hypothesis #5, tests for reduced models and parsimony were carried out. Some independent variables were insignificant in the combined equation and, as such, should not be included in the model for that particular output measure. These were removed to create a more condensed model. In addition, some independent variables were deemed significant, but contributed very little to the overall explanation of variance in the output variable. Following the principle of parsimony, tests were carried out to determine whether or not these variables should remain in the equation, or be excluded in order to create a model with fewer independent variables. The test statistic for parsimony and best-fit is the Partial F-test:

$$F = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} \tag{3.3}$$

Where SSE_1 is the sum of squares error of the reduced model (the model that does not contain the independent variable in question), SSE_2 is the sum of squares error of the full model (the model containing all independent variables), k is the number of independent variables being tested for parsimony, and MSE_2 is the mean squared error of the full model. The resulting F-value is then compared to a tabulated F-value at $F_{k,n-p-k-1}$ where n is total degrees of freedom plus one, and p is the number of independent variables in the reduced model. If the calculated F-value is less than the tabulated F-value, it is impossible to conclude that the variable in question significantly contributes to explaining the variation in the dependent variable. As such, it should be excluded from the model. After all tests for parsimony were complete and all non-contributors removed, the best-fit model remained.

3.7 Limitations

3.7.1 Absence of Medical School History

One of the more significant limitations of this study is its inability to account for respondents' medical school history. The literature has identified the country of graduation as one of the determinants of output in physicians practicing in Canada. The questionnaire from which this study's data were drawn did not include questions regarding medical schools. The result of this omission is an inability to measure the effects of medical school on output; more specifically – do internationally trained physicians score higher or lower on the study's output measures? The literature suggests that International Medical Graduates tend to produce greater levels of output. The literature suggests, in addition, that this group of physicians has proportionately more male members and tends to be older than the domestically trained group – two characteristics that have been found by the literature to increase output. Nonetheless it would have been beneficial to isolate the effects of this phenomenon.

3.7.2 Sample Size

That statistical power of a cross sectional questionnaire study is inherently constrained by the study's sample size. The responses to specific questions were used to create variables which broke the sample down into groups, sometimes 2 or 3 groups (gender and payment method), sometimes more (age, group size). The further one splits the sample, the smaller the number of respondents in each category. As such, some cells may have had an insufficient sample size to find statistical differences that may otherwise have been found.

In order to examine the statistical power of the analysis, power tests were conducted. While the power levels are presented with the results, the process and calculations through which power levels were arrived at are included as Appendix E.

3.7.3 Self-Reported Data

There are inherent limitations to the use of 'self-reported data'. First and foremost, a study using this method assumes that participants have sufficient

information available to them to provide accurate responses. It assumes, in addition, that participants are not fabricating the information that they report. The questions asked by the survey associated with this study require answers that are seemingly within respondents' capacity. One can also assume that respondents are answering questions in good faith. There remains, however small, a chance that one of these two assumptions has been violated.

4.0 Results

The results will be presented in five sections. Section 4.1 will present the distribution of each variable employed by the study, both independent and dependent. Section 4.2 will then provide means and standard deviations for each of the same variables. Once the sample has been described in detail, Section 4.3 will present a comparative analysis of the output scores for respondents grouped on the basis of gender, age, payment method, and practice size. This will identify actual statistically significant differences between groups of GP/FPs. Section 4.4 then presents regression analyses that were conducted to quantify the contribution of each independent variable to output of GP/FP services.

4.1 Sample Distributions

In this section, the sample will be described in terms of each independent and then each dependent variable. Each subsection displays salient information and provides an explanation of the data that has been presented.

4.1.1 Gender

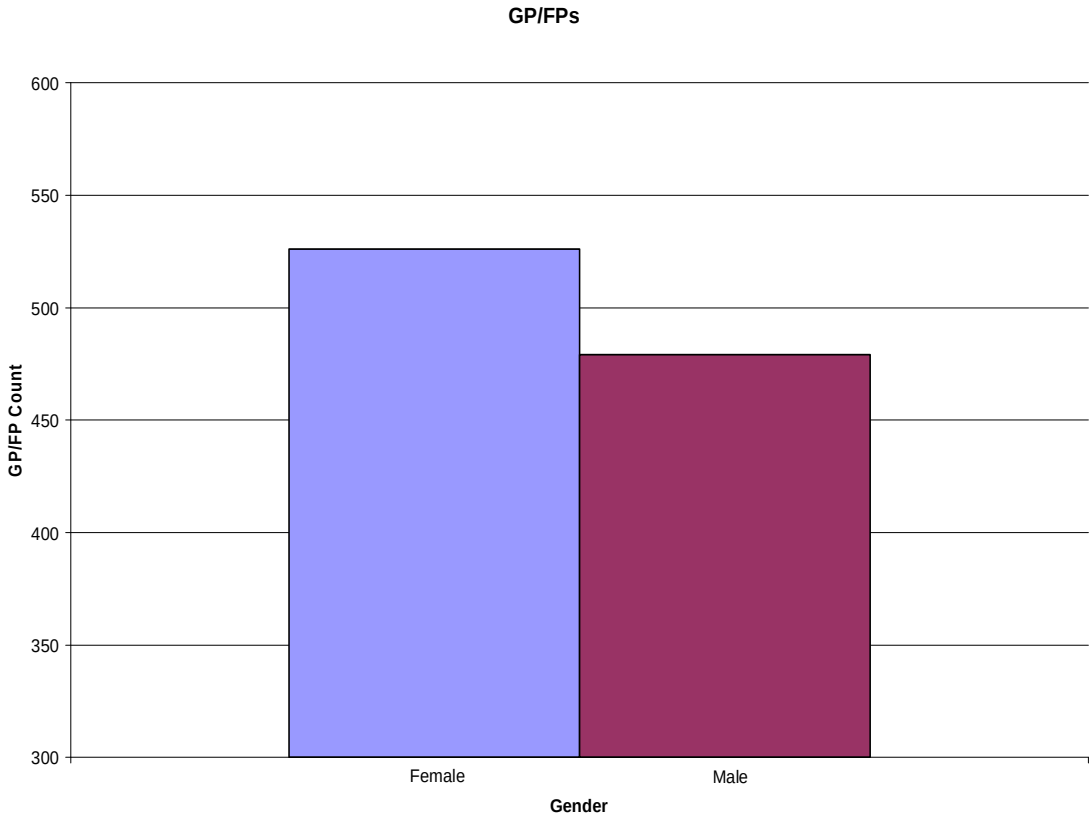

Figure 4.1.1 – Gender Distribution of Sample

The sample stratification, described in the methodology, resulted in a greater number of responses from female GP/FPs (526) than from male GP/FPs (479) – one GP/FP declined to report his or her gender. As such, the duration of the description section – and indeed the entire comparative analysis – is presented once for responding females and once for responding males, in order to correct for the stratification, which misrepresents the actual physician population.

4.1.2 Age

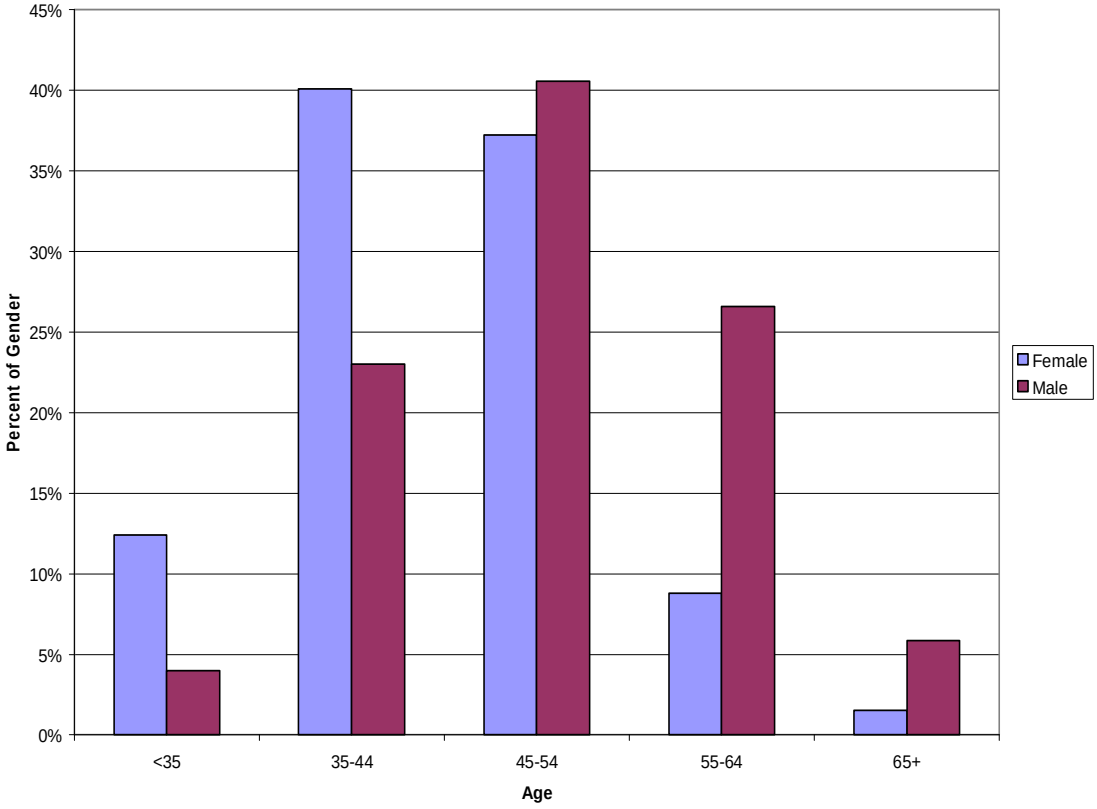

Figure 4.1.2 – Age Distribution of Sample

In terms of age distribution, the female sample was concentrated most heavily within the 35-54 range - of the 524 responding females, 405 (77%) fell within this group. Just 8 female respondents were over the age of 65, while 65 females were under the age of 35. The male sample displayed more breadth with respect to age than the female sample. Most male respondents (194 or 40.5%) fell within the 45-54 age range. Another 127 (26.5%) fell within the 55-64 range, and another 110 (23%) within the 35-44 group. The study acquired responses from 28 male physicians 65 years of age or older, and just 19 from male physicians below the age of 35.

4.1.3 Payment Method

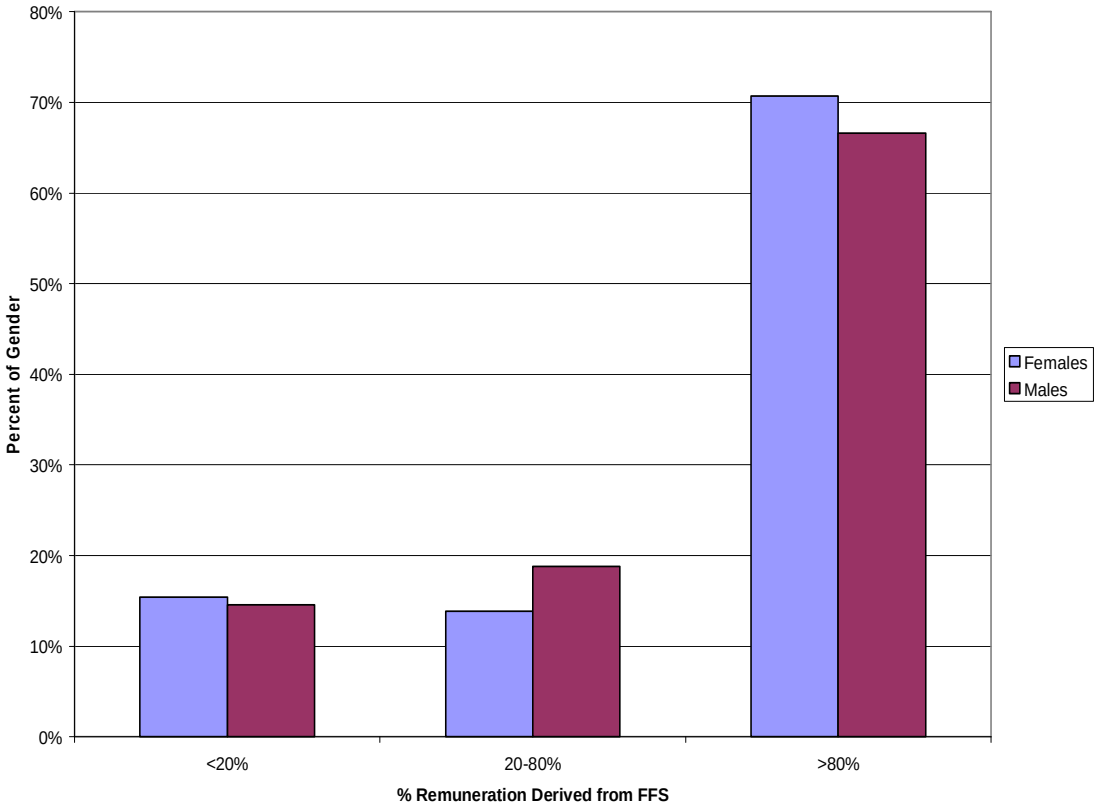

Figure 4.1.3 – %FFS Distribution of Sample

Of the 526 responding female GP/FPs, 372 (70.7%) reported that fee for service payments account for over 80% of their total income. Just 81 (15.4%) females reported that FFS income accounted for less than 20% of their income, while 73 (13.9%) of female respondents reported a FFS level somewhere between 20 and 80%.

Like their female counterparts, the vast majority (319 or 66.6%) of male respondents reported a fee for service level above 80% of their total income. Just 70 male respondents (14.6%) received 20% or less of their income through fee for service, and just 90 (18.8%) reported a level between 20 and 80 per cent.

4.1.4 Practice Size

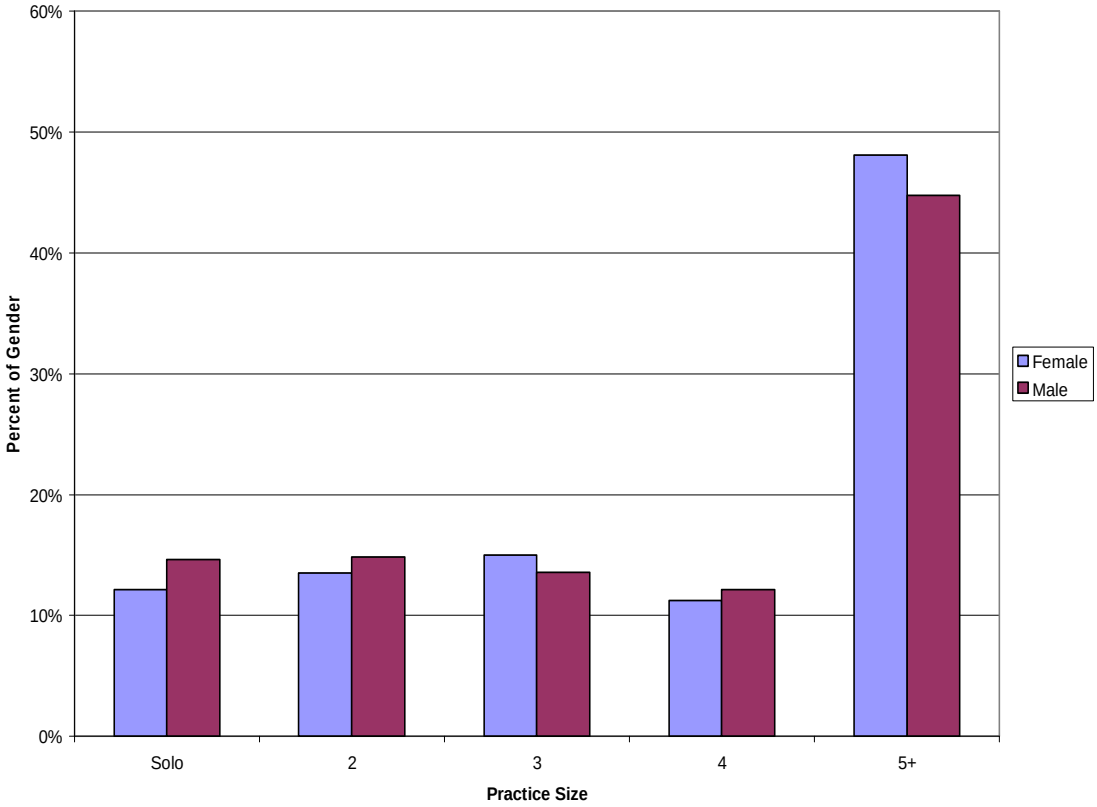

Figure 4.1.4 – Practice Size Distribution of Sample

A large number of reported practice sizes for female GP/FPs exceeded four physicians. Practices of five or more physicians accounted for 253 (48.1%) of the 526 responses. The remaining female respondents were distributed relatively evenly across the rest of the practice size categories.

Male respondents were distributed almost identically to their female counterparts on the basis of practice size. Once again, practices of five or more GP/FPs were the most common, accounting for 214 (44.7%) of the 478 male respondents. The remaining practice size categories were virtually even, as no more than 2.5 percentage points separate any two groups.

4.1.5 Total Patient Visits per Week (*Total Visits)*

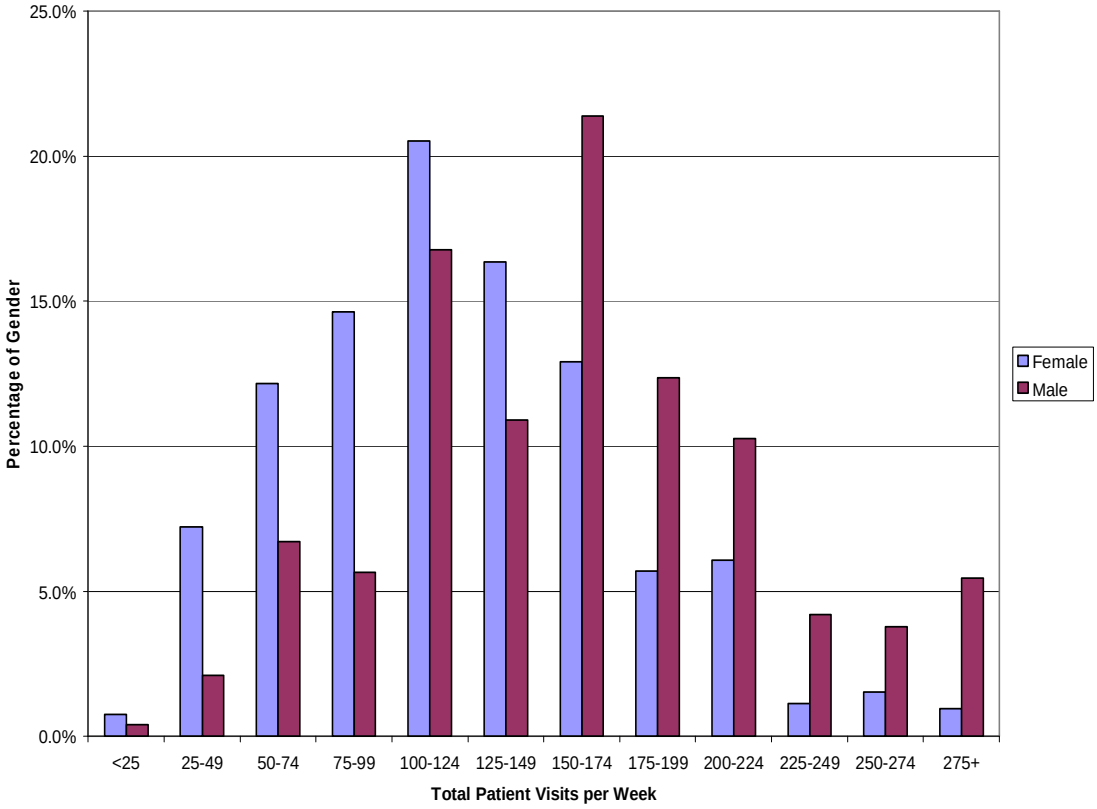

Figure 4.1.5 – Distribution of Total Weekly Patient Visits

The distribution of female physicians with respect to their total patient visits per week approximated a normal distribution about the 100-124 patients per week level. Of the 526 responding female GP/FPs, 108 (20.5%) reported *total visits* in the 100-124 range, the highest total in any one category. As depicted in Figure 4.5.1, the majority (51.4%) of female respondents reported *total visits* higher than 75, but less than 150. Just 8% of female GP/FPs reported *total visits* lower than 50 patients per week, and just 15.4% reported fewer than 175 total patients per week.

The distribution of responding male GP/FPs also approximated a normal distribution, however, the bulk of male GP/FPs reported higher *total visits* than their female counterparts. Interestingly, the most frequently occurring reported *total visits* categories – 100-124 and 150-175 – were not adjacent. The 100-124 group contained 80 respondents, the 125-149 group contained 52 respondents, and the 150-174 group contained 102 respondents, the highest level of any category. Just 14.9% of responding

males reported fewer than 100 *total visits*, while 23.6% reported *total visits* in excess of 200 patients per week.

4.1.6 Patient Visits per Week During Regular Hours (*Regular Visits*)

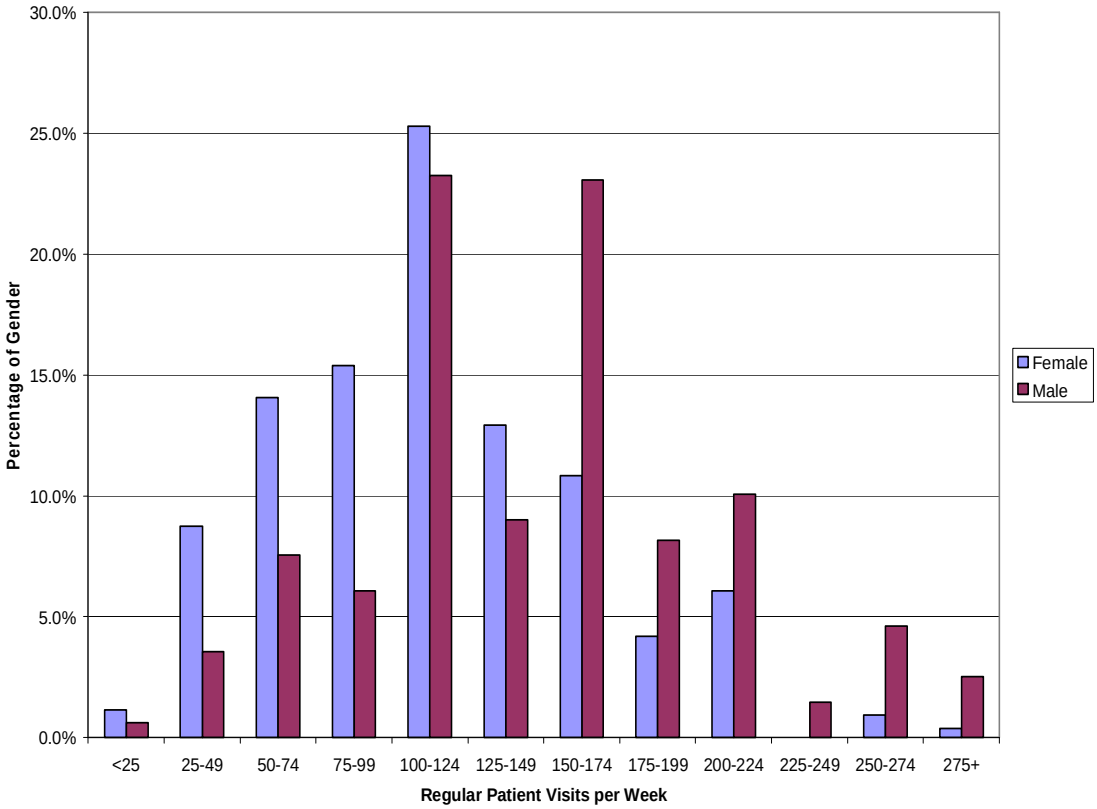

Figure 4.1.6 – Distribution of Weekly Patient Visits – Regular Hours

Over one quarter (25.3%) of responding female GP/FPs reported *regular visits* in the range of 100-124. The remaining physicians were concentrated between a *regular visit* load of 50 and one of 174. Just 9.9% of females reported levels below 50, and another 7.5% reported *regular visits* in excess of 200 patients per week.

Once again, male physicians were concentrated at higher output levels than their female counterparts. Almost half (46.2%) of male respondents fell within one of two categories: the 100-124 range or the 150-174 range. The two largest groups were once again non-adjacent. The range in between – 125-149 – accounted for just 43 (9%) of physicians, a count comparable to other smaller groups like the 50-74 range (36), the

175-199 range (39) and the 200-224 range (48). Just 17.8% of responding male GP/FPs reported fewer than 100 *regular visits*; another 18.6% reported levels in excess of 200 patients per week during regular hours.

4.1.7 Patient Visits per Week While On Call (*On Call Visits*)

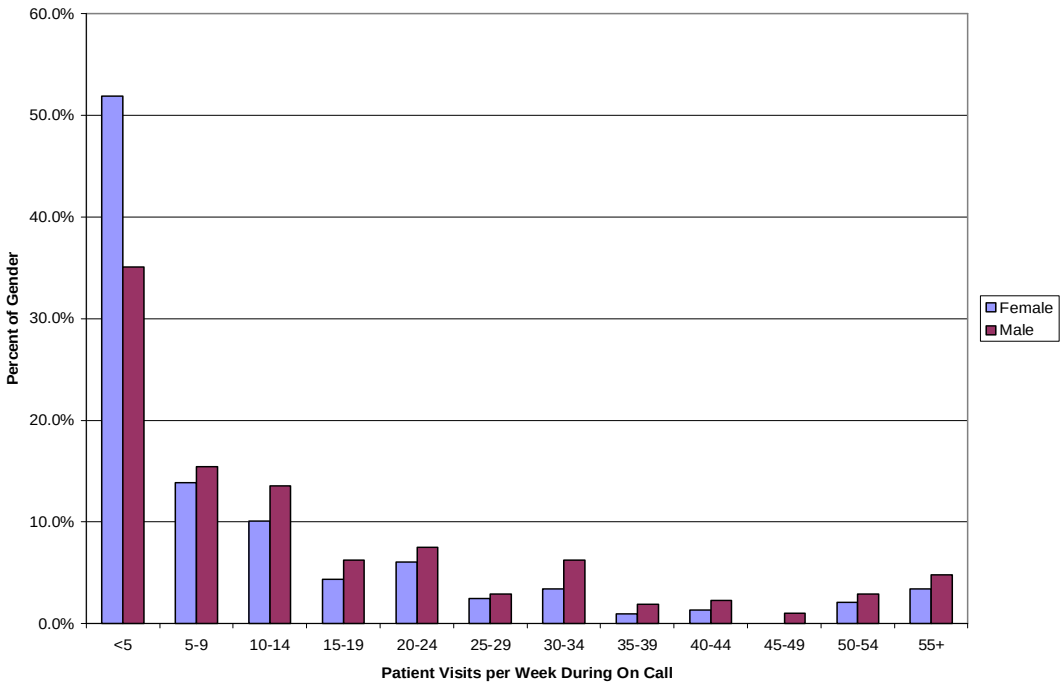

Figure 4.1.7 – Distribution of Weekly Patient Visits – On Call

As displayed in Figure 4.1.7, the majority (51.9%) of female respondents reported fewer than five *on call visits* per week. The 5-9 range and the 10-14 range contained 13.9 and 10.1 per cent respectively; all other groups contained fewer than 7% of the responding female sample, and accounted for 18.9% when combined.

Male respondents were also concentrated below the 5 visits per week mark, but their concentration (35.1%) was not as significant as the female sample. The 5-9 range and the 10-14 range accounted for 15.4 and 13.6 per cent of the male sample respectively. No other category accounted for more than 7.5% of responses on its own, though 35.9 per cent of male respondents reported *on call visits* in excess of 15 per week.

4.1.8 Hours Worked per Week (*Hours Worked*)

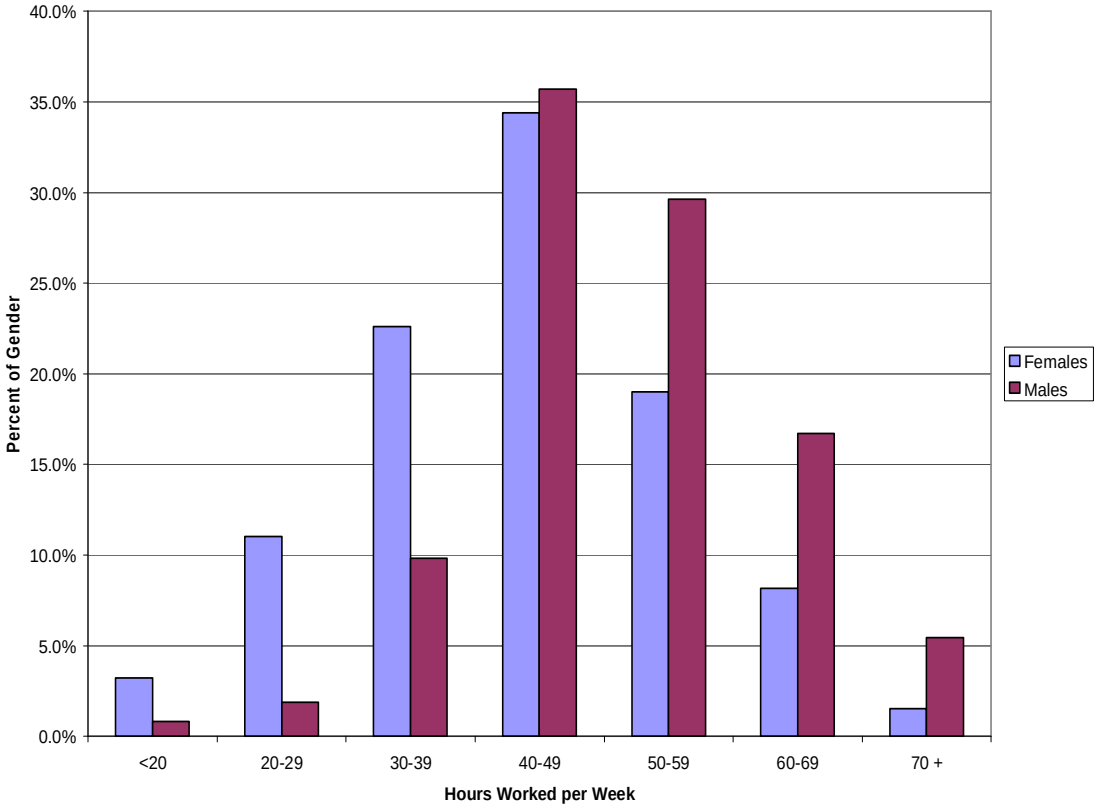

Figure 4.1.8 – Distribution of Hours Worked per Week

The distribution of *hours worked* by female respondents was approximated a normal curve. The largest group, numbering 181 (34.4%) reported a regular workweek ranging from 40-49 hours. Another 22.6% of respondents reported 30-39 *hours worked*, and 19% reported a work week between 50 and 59 hours in length. Just 14 per cent of female respondents worked fewer than 30 hours per week, while 9.7% reported workweeks in excess of 60 hours.

The *hours worked* distribution for male respondents is somewhat skewed. Over four fifths of the responding male sample (87.5%) reported work weeks in excess of 40 hours. The largest group, the 40-49 range, accounted for 35.7% of male respondents, while the 50-59 and 60-69 categories contained 29.6 and 16.7 per cent of the responding males respectively. Over one twentieth (5.4%) of male respondents reported work weeks that exceed 70 hours.

4.1.9 Patient Visits per Hour (*Visits per Hour*)

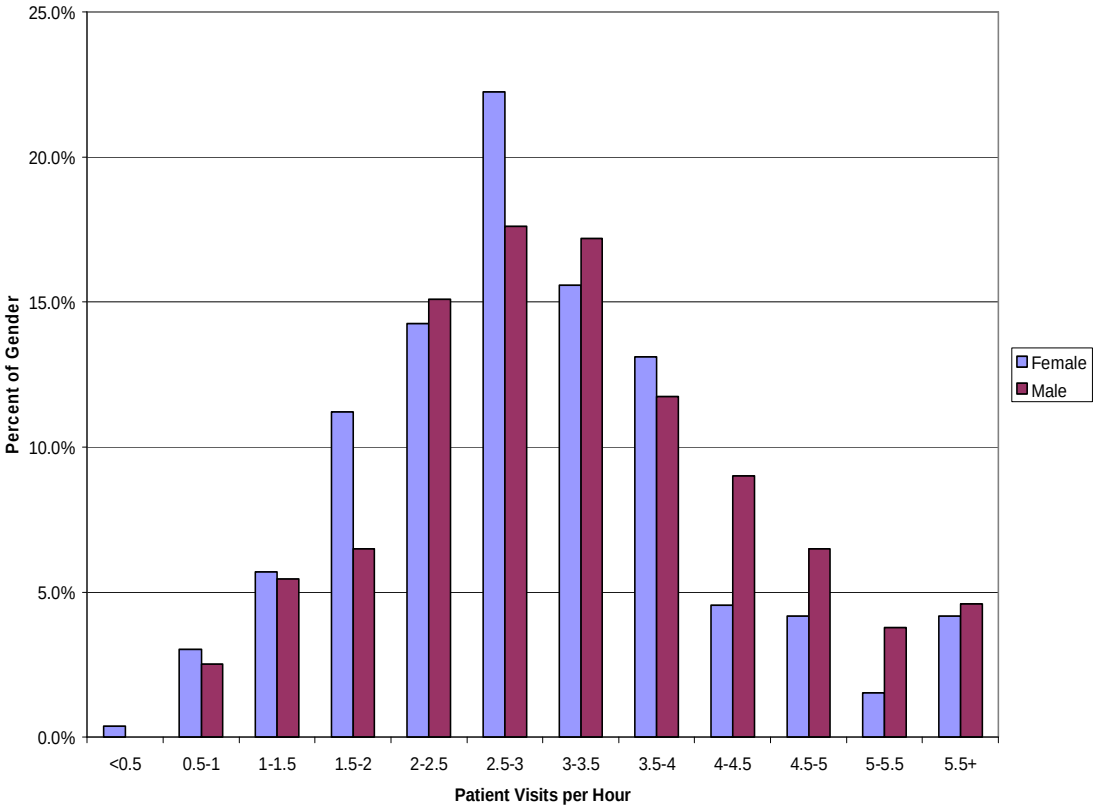

Figure 4.1.9 – Distribution of Patient Visits per Hour Worked

Patient visits per hour for female responding GP/FPs displayed an approximate normal distribution. The largest contingent, the 2.5-3 range, accounted for just under one quarter (22.2%) of all responding females. Respondents were concentrated heavily between the 1.5 and the 4 *visits per hour* mark; this cluster accounted for over three quarters (76.4%) of all responding females. Just 9.1% of respondents reported seeing fewer than 1.5 patients per hour, while 14.5% exceeded 4 *visits per hour*.

Male respondents displayed a similar normal distribution to that of their female colleagues, although the former were slightly more concentrated toward the upper end of the *visits per hour* scale. The majority of male respondents (61.3%) conducted between 2 and 4 *visits per hour*. The 2-2.5, 2.5-3, and 3-3.5 ranges were similar, accounting for 15, 17.5, and 17.1 per cent of the responding male sample respectively. Just 14.5 per cent of responding males reported seeing fewer than two, while 14.9% exceeded 4 *visits per hour*.

4.2 Sample Means and Standard Deviations

Table 4.2 – Sample Means and Standard Deviations for Study Variables

Measure	Total		Female		Male		Comparisons (F to M)		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	F-M	t-value	p-value
Independent									
Age	47.11	9.27	44.13	8.29	50.39	9.20	-6.26	-11.27	0.000
Payment (% FFS)	78.30	34.51	78.19	35.65	78.37	33.25	-0.18	-0.085	0.932
Practice Size	5.97	6.68	6.22	7.07	5.69	6.22	0.53	1.250	0.211
Dependent									
Total Visits	138.04	61.94	120.69	54.42	157.15	64.18	Conducted in Section 4.3.1		
Regular Visits	124.70	56.30	109.23	49.58	141.70	58.41			
On Call Visits	13.41	21.40	11.47	20.33	15.57	22.35			
Hours Worked	45.06	12.35	41.20	12.09	49.33	11.20			
Visits per Hour	3.11	1.27	3.00	1.24	3.24	1.29			

4.2.1 Independent Variables

The average reported age of female respondents was 44.13 years, compared to 50.39 years for their male colleagues. As evidenced by the standard deviations presented in Table 4.2, the age of male respondents was slightly more variable than that of their female counterparts. From a statistical standpoint, the t-test conducted revealed that the age difference between male and female respondents was statistically significant.

Responding female and male GP/FPs reported virtually identical means with respect to the percentage of their remuneration collected through fee for service billings. Both groups reported a mean percentage just over 78% and displayed roughly the same variation. The t-test conducted found no statistically significant difference between genders on the basis of payment method.

In terms of practice size, female respondents reported a mean slightly higher than that of their male colleagues. Female respondents reported an average practice size of 6.22 physicians, while males reported an average size of 5.69 physicians. Variability, as

measured by the standard deviations presented, was similar between the two genders, though the female figure was slightly higher. The t-test conducted could not conclude the difference in reported practice size between genders was statistically significant.

4.2.2 Dependent Variables

Male respondents within the sample reported a higher mean score than their female colleagues with respect to *total visits*. Female physicians reported a mean score of 120.69 *total visits*, roughly 37 visits fewer than males, whose mean score was 157.15. Male physicians displayed more variability in *total visits* as evidenced by the standard deviations displayed above.

The apparent output discrepancies between the genders were even more apparent when one appeals to the *regular visits* measure. Male respondents averaged 141.70 *regular visits*, more than 30 visits higher than the 109.23 mean reported by their female colleagues. Once again male GP/FP respondents displayed more variability than females. Continuing the trend, males once again reported higher output levels as measured by *on call visits*. Male GP/FPs report average 15.57 weekly patient visits while on call, while females report 11.47 patient visits. Once again, responses from male GP/FPs were slightly more variable than those of their female colleagues.

Male respondents also reported higher mean *hours worked* than their female counterparts. The average male respondent reported an average workweek of 49.33 hours, compared to the 41.2 hour workweek reported by the collective female sample. Unlike other output measures, females were slightly more variable in their hours worked per week than their male colleagues.

With respect to the final measure examined in this study – patient visits per hour worked – male respondents once again reported higher levels of output than their female colleagues. Male GP/FPs reported an average of 3.24 patients per hour compared to 3.00 patients for females; variability was virtually identical.

4.3 Comparative Analyses

The effect of each independent variable on each output measure is presented below. A pictorial representation precedes a series of tables for each independent variable and an explanation of the results. The pictorial representations - or 'Figures' as labeled below - are included in order to present trends in the data. Differences between groups that appear to exist in the Figures should be confirmed in the corresponding Tables, which provide actual statistical differences based on the analyses of variance and t-tests. Significant differences ($p <= 0.05$) are **bolded**.

4.3.1 The Effect of Gender on Measures of GP/FP Output

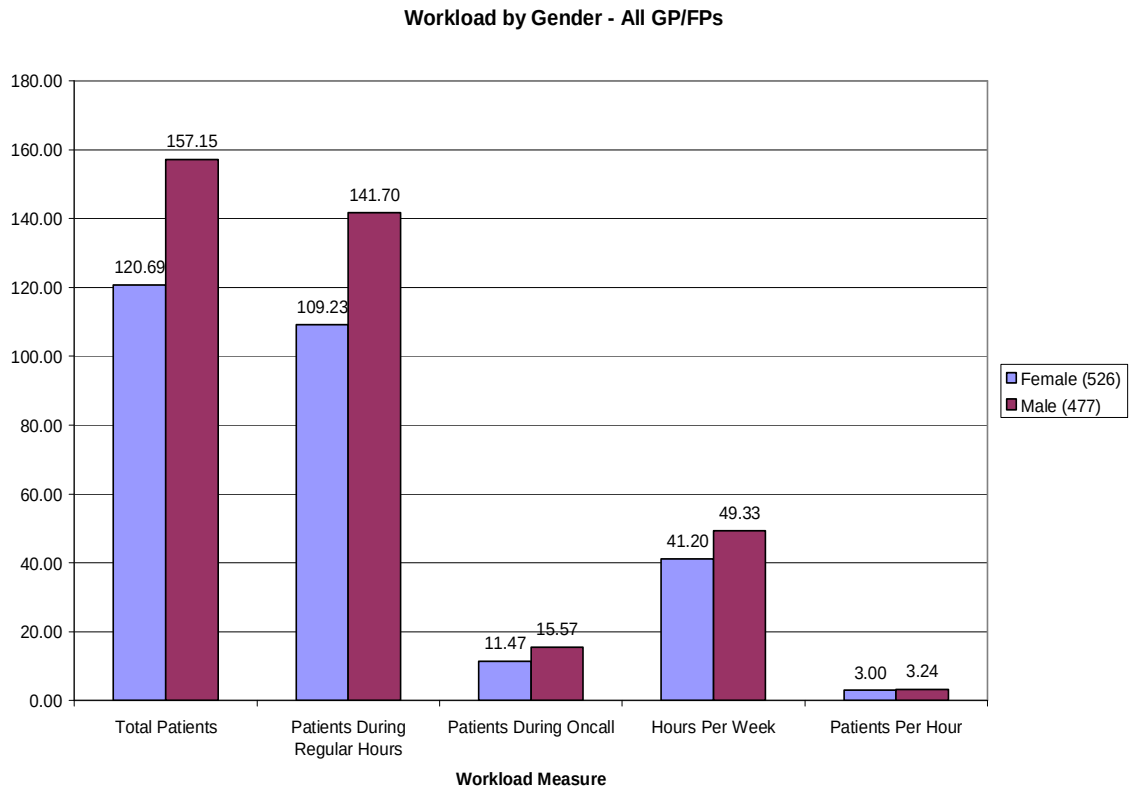

Figure 4.3.1 – The Effect of Gender on GP/FP Output of Services

Figure 4.3.1 presents mean scores for males and females for each of the five output measures. In each case, males reported higher output levels than their female colleagues. Female respondents reported 23% fewer *total visits* and *regular visits* than their male colleagues. Females also reported 26% fewer *on call visits*, worked 16%

fewer hours, and reported 8% fewer *visits per hour*. Table 4.3.1 presents the statistical significance of these differences.

Table 4.3.1 – The Effect of Gender on GP/FP Output of Services

t-test - Gender vs. Output										
Measure	Gender				Mean Dif. (F-M)	t-value	p-value (sig.)	Pooled STD	Zbeta	Power
	Female (N=526)		Male (N=477)							
	Mean	STD	Mean	STD						
Total Patients	120.69	54.42	157.15	64.18	-36.46	-9.652	0.000	59.26	3.23	1.00
Patients During Regular Hours	109.23	49.58	141.70	58.41	-32.47	-9.444	0.000	53.96	3.34	1.00
Patients During Oncall	11.47	20.33	15.57	22.35	-4.10	-3.033	0.002	21.31	3.01	1.00
Hours Per Week	41.20	12.09	49.33	11.20	-8.13	-11.063	0.000	11.68	7.73	1.00
Patients Per Hour	3.00	1.24	3.24	1.29	-0.24	-2.995	0.003	1.26	12.27	1.00

The 'Mean Difference' column presents the mean score from males subtracted from the mean score for females. In every case, the value is negative, indicating a higher output level for males than females on every output measure employed. The reader should not compare the *mean differences* to one another, as the measures are presented with different units (patients per week vs. hours per week vs. patients per hour).

The analyses found, in all measured output categories without exception, the mean output scores for male GP/FPs were significantly higher than those for their female counterparts. In the case of all output variables the t-test produced highly significant p-values, all of them below 0.005. These findings were sufficient to reject the null hypothesis and conclude that reported output of physician services differed between male and female GP/FPs.

4.3.2 The Effects of Age on GP/FP Output

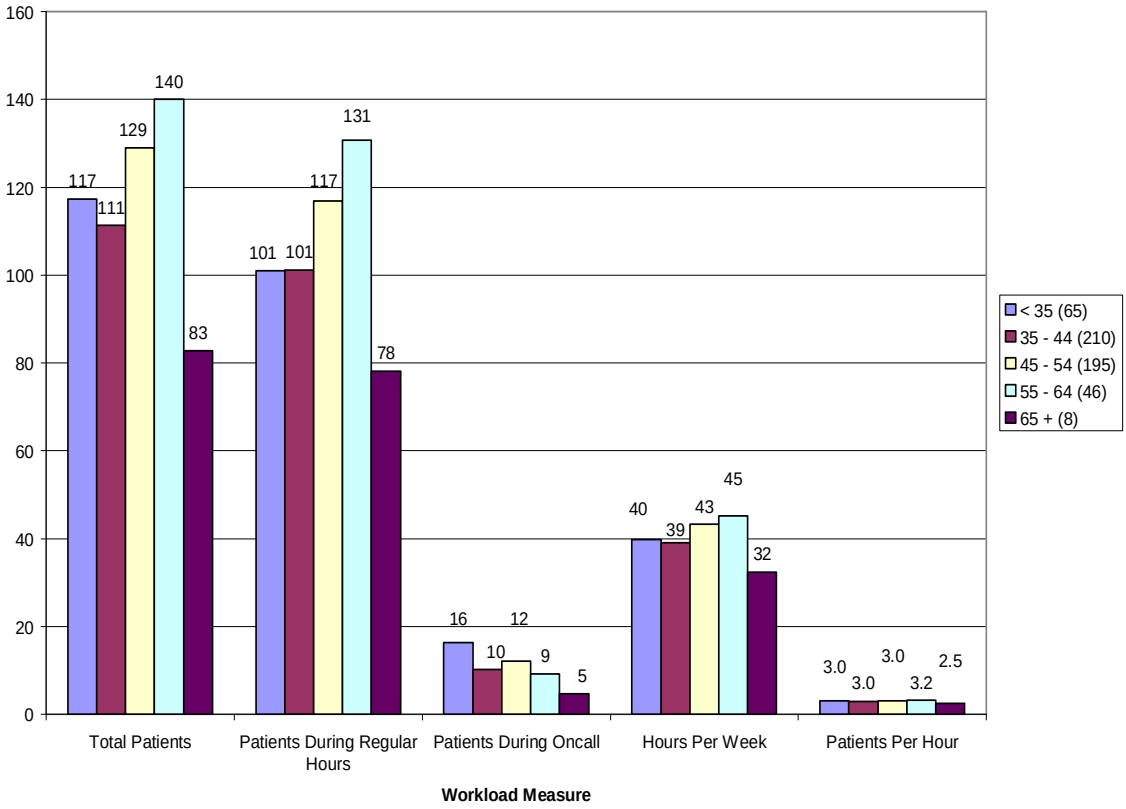

Figure 4.3.2a – The Effect of Age on Output for Female GP/FPs

Trends with regard to the effect of age on output for female respondents (see Figure 4.3.2a) suggest output is highest for physicians within the 45-54 and 55-64 age groups. Reported output for respondents within the youngest bracket (< 35) appears to be relatively similar to that reported by GP/FPs in the 35-44 group, while physicians over 65 years old reported output levels that were substantially lower than their colleagues in all other age categories. With the exception of *on call visits*, where the youngest GP/FPs were most active, respondents in the 55-64 group reported the highest levels of output. *Visits per hour* were relatively similar, though the 55-64 group reported the highest level while the 65+ group reported the lowest. The statistical significance of these apparent trends is presented in Table 4.3.2a below.

Table 4.3.2a – The Effect of Age on Output for Female GP/FPs

The Effects of Age on Total Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	65	117.37	50.27	35 - 44	210	111.31	50.05	6.06	0.959	50.10	2876.31	0.11	0.05	0.52
< 35	65	117.37	50.27	45 - 54	195	129.01	58.75	-11.64	0.681	56.76	2876.31	-0.22	1.35	0.09
< 35	65	117.37	50.27	55 - 64	46	140.00	52.21	-22.63	0.310	51.08	2876.31	-0.42	2.71	1.00
< 35	65	117.37	50.27	65 +	8	82.75	46.56	34.62	0.564	49.92	2876.31	0.65	3.97	1.00
35 - 44	**210**	**111.31**	**50.05**	**45 - 54**	**195**	**129.01**	**58.75**	**-17.70**	**0.028**	**54.41**	**2876.31**	**-0.33**	**4.59**	**1.00**
35 - 44	**210**	**111.31**	**50.05**	**55 - 64**	**46**	**140.00**	**52.21**	**-28.69**	**0.030**	**50.44**	**2876.31**	**-0.53**	**7.14**	**1.00**
35 - 44	210	111.31	50.05	65 +	8	82.75	46.56	28.56	0.702	49.94	2876.31	0.53	6.48	1.00
45 - 54	195	129.01	58.75	55 - 64	46	140.00	52.21	-10.99	0.815	57.58	2876.31	-0.20	1.00	0.84
45 - 54	195	129.01	58.75	65 +	8	82.75	46.56	46.26	0.223	58.37	2876.31	0.86	9.33	1.00
55 - 64	46	140.00	52.21	65 +	8	82.75	46.56	57.25	0.102	51.49	2876.31	1.07	6.21	1.00

The Effects of Age on Regular Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	65	100.98	42.39	35 - 44	210	101.15	46.34	-0.17	1.000	45.44	2373.82	0.00	-1.90	0.03
< 35	65	100.98	42.39	45 - 54	195	116.86	53.62	-15.88	0.271	51.07	2373.82	-0.33	3.05	1.00
< 35	**65**	**100.98**	**42.39**	**55 - 64**	**46**	**130.78**	**46.29**	**-29.80**	**0.040**	**44.04**	**2373.82**	**-0.61**	**5.17**	**1.00**
< 35	65	100.98	42.39	65 +	8	78.13	44.72	22.85	0.814	42.63	2373.82	0.47	2.62	1.00
35 - 44	210	101.15	46.34	45 - 54	195	116.86	53.62	-15.71	0.340	49.98	2373.82	-0.32	4.37	1.00
35 - 44	**210**	**101.15**	**46.34**	**55 - 64**	**46**	**130.78**	**46.29**	**-29.63**	**0.008**	**46.33**	**2373.82**	**-0.61**	**8.27**	**1.00**
35 - 44	210	101.15	46.34	65 +	8	78.13	44.72	23.02	0.787	46.29	2373.82	0.47	5.38	1.00
45 - 54	195	116.86	53.62	55 - 64	46	130.78	46.29	-13.92	0.552	52.32	2373.82	-0.29	2.17	0.99
45 - 54	195	116.86	53.62	65 +	8	78.13	44.72	38.73	0.304	53.34	2373.82	0.79	8.39	1.00
55 - 64	46	130.78	46.29	65 +	8	78.13	44.72	52.65	0.095	46.08	2373.82	1.08	6.44	1.00

The Effects of Age on On Call Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	65	16.38	23.77	35 - 44	210	10.17	18.77	6.21	0.326	20.05	412.62	0.31	3.18	1.00
< 35	65	16.38	23.77	45 - 54	195	12.15	21.81	4.23	0.715	22.31	412.62	0.21	1.10	0.84
< 35	65	16.38	23.77	55 - 64	46	9.22	16.15	7.16	0.501	20.96	412.62	0.35	1.64	0.95
< 35	65	16.38	23.77	65 +	8	4.63	6.55	11.75	0.665	22.66	412.62	0.58	2.47	0.99
35 - 44	210	10.17	18.77	45 - 54	195	12.15	21.81	-1.98	0.915	20.29	412.62	-0.10	0.00	0.50
35 - 44	210	10.17	18.77	55 - 64	46	9.22	16.15	0.95	0.999	18.33	412.62	0.05	-1.13	0.13
35 - 44	210	10.17	18.77	65 +	8	4.63	6.55	5.54	0.966	18.50	412.62	0.27	2.46	0.99
45 - 54	195	12.15	21.81	55 - 64	46	9.22	16.15	2.93	0.941	20.86	412.62	0.14	0.22	0.59
45 - 54	195	12.15	21.81	65 +	8	4.63	6.55	7.52	0.901	21.46	412.62	0.37	3.03	1.00
55 - 64	46	9.22	16.15	65 +	8	4.63	6.55	4.59	0.986	15.21	412.62	0.23	0.26	0.61

The Effects of Age on Hours Worked for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	65	39.85	10.81	35 - 44	210	39.12	13.19	0.73	0.996	12.67	141.39	0.06	-1.00	0.16
< 35	65	39.85	10.81	45 - 54	195	43.27	11.23	-3.42	0.401	11.13	141.39	-0.29	3.00	1.00
< 35	65	39.85	10.81	55 - 64	46	45.11	9.12	-5.26	0.262	10.15	141.39	-0.44	3.50	1.00
< 35	65	39.85	10.81	65 +	8	32.38	13.76	7.47	0.590	11.14	141.39	0.63	3.77	1.00
35 - 44	**210**	**39.12**	**13.19**	**45 - 54**	**195**	**43.27**	**11.23**	**-4.15**	**0.016**	**12.29**	**141.39**	**-0.35**	**4.84**	**1.00**
35 - 44	**210**	**39.12**	**13.19**	**55 - 64**	**46**	**45.11**	**9.12**	**-5.99**	**0.050**	**12.57**	**141.39**	**-0.50**	**5.67**	**1.00**
35 - 44	210	39.12	13.19	65 +	8	32.38	13.76	6.74	0.648	13.21	141.39	0.57	5.57	1.00
45 - 54	195	43.27	11.23	55 - 64	46	45.11	9.12	-1.84	0.926	10.86	141.39	-0.15	0.67	0.75
45 - 54	195	43.27	11.23	65 +	8	32.38	13.76	10.89	0.170	11.33	141.39	0.92	11.74	1.00
55 - 64	46	45.11	9.12	65 +	8	32.38	13.76	12.73	0.100	9.87	141.39	1.07	7.52	1.00

The Effects of Age on Visits per Hour for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	65	3.04	1.22	35 - 44	210	2.96	1.17	0.08	0.996	1.18	1.55	0.06	-0.84	0.20
< 35	65	3.04	1.22	45 - 54	195	3.02	1.36	0.02	1.000	1.33	1.55	0.02	-1.72	0.04
< 35	65	3.04	1.22	55 - 64	46	3.15	1.16	-0.11	0.994	1.20	1.55	-0.09	-0.99	0.16
< 35	65	3.04	1.22	65 +	8	2.45	0.61	0.59	0.808	1.17	1.55	0.47	2.33	0.99
35 - 44	210	2.96	1.17	45 - 54	195	3.02	1.36	-0.06	0.992	1.27	1.55	-0.05	-1.01	0.16
35 - 44	210	2.96	1.17	55 - 64	46	3.15	1.16	-0.19	0.927	1.17	1.55	-0.15	0.64	0.74
35 - 44	210	2.96	1.17	65 +	8	2.45	0.61	0.51	0.860	1.16	1.55	0.41	4.55	1.00
45 - 54	195	3.02	1.36	55 - 64	46	3.15	1.16	-0.13	0.984	1.32	1.55	-0.10	-0.44	0.33
45 - 54	195	3.02	1.36	65 +	8	2.45	0.61	0.57	0.800	1.34	1.55	0.46	4.10	1.00
55 - 64	46	3.15	1.16	65 +	8	2.45	0.61	0.70	0.704	1.10	1.55	0.56	2.71	1.00

Table 4.3.2a presents the mean scores for the effects of age on female GP/FP output of services. The analysis confirmed that significant differences in *total visits*, *regular visits*, and *hours worked* exist between females within different age groups. The apparent differences in *on call visits* and *visits per hour* were not confirmed. The analysis identified differences in *total visits*, *regular visits*, and *hours worked* between the 65+ group and the two immediately younger groups (45-54, 55-64). No other differences could be confirmed as statistically significant by the analysis.

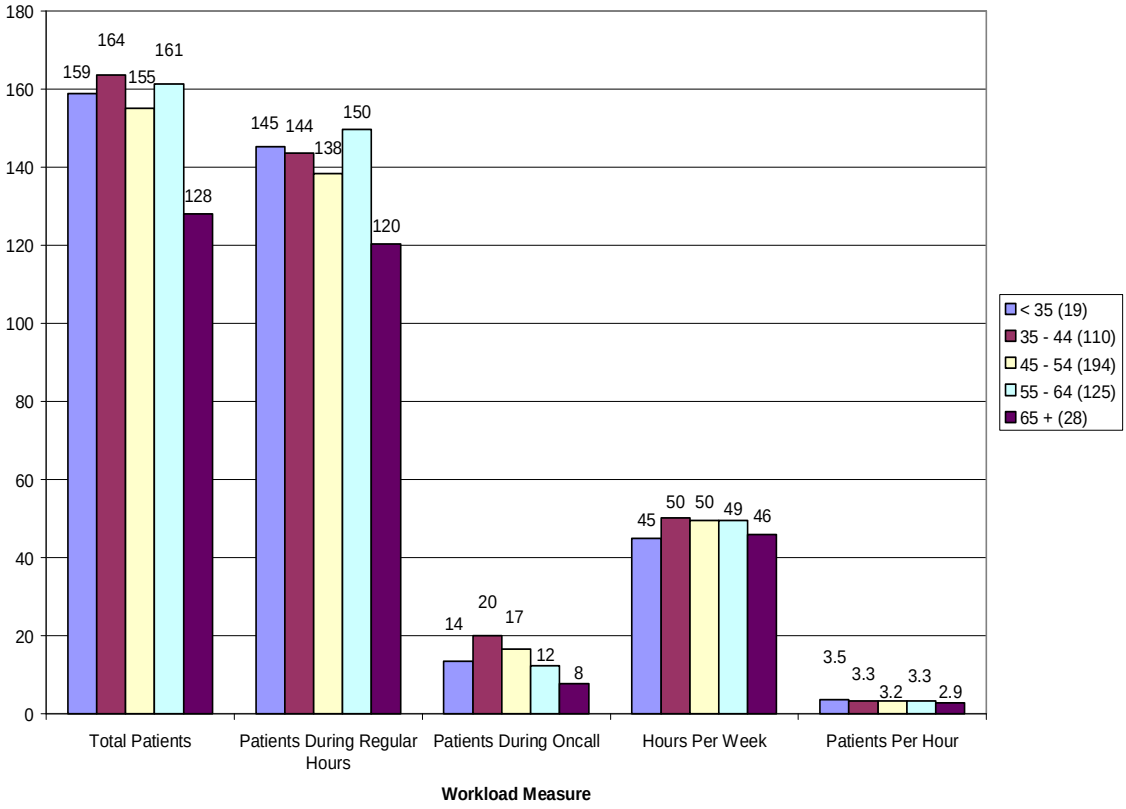

Figure 4.3.2b – The Effect of Age on Output for Male GP/FPs

The trend presentation provided in Figure 4.3.2b suggests the effects of age on output of GP/FP services may not be as pronounced for males as for females. In each volume output measure, males in the 65+ age group reported substantially lower levels of output than their colleagues in other age categories. The upward trend at the lower end of the age scale that was present with female physicians was not as apparent with males. Males in the 35-44 age group reported the highest levels of *total visits* and *on*

call visits, but reported fewer *regular visits* than the 55-64 group and almost identical *regular visits* to the <35 group.

In terms of reported *hours worked*, males in all age groups were relatively similar: the highest groups (34-44, 45-54) reported 50 hours per week, and the lowest (<35) reported 45 hours per week. The *visits per hour* values were also quite similar, though appeared to fall as age increased. Table 4.3.2b below presents the statistical significance of these trends.

Table 4.3.2b – The Effect of Age on Output for Male GP/FPs

The Effects of Age on Total Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	19	158.79	52.47	35 - 44	110	163.68	68.19	-4.89	0.999	66.19	4090.34	-0.08	-1.12	0.13
< 35	19	158.79	52.47	45 - 54	193	155.41	59.36	3.38	1.000	58.80	4090.34	0.05	-1.12	0.13
< 35	19	158.79	52.47	55 - 64	125	161.34	67.21	-2.55	1.000	65.53	4090.34	-0.04	-1.49	0.07
< 35	19	158.79	52.47	65 +	28	128.11	68.93	30.68	0.626	62.87	4090.34	0.48	1.39	0.92
35 - 44	110	163.68	68.19	45 - 54	193	155.41	59.36	8.27	0.864	62.70	4090.34	0.13	0.34	0.63
35 - 44	110	163.68	68.19	55 - 64	125	161.34	67.21	2.34	0.999	67.67	4090.34	0.04	-1.43	0.08
35 - 44	110	163.68	68.19	65 +	28	128.11	68.93	35.57	0.143	68.34	4090.34	0.56	4.15	1.00
45 - 54	193	155.41	59.36	55 - 64	125	161.34	67.21	-5.93	0.947	62.56	4090.34	-0.09	-0.27	0.39
45 - 54	193	155.41	59.36	65 +	28	128.11	68.93	27.30	0.363	60.62	4090.34	0.43	4.73	1.00
55 - 64	125	161.34	67.21	65 +	28	128.11	68.93	33.23	0.188	67.52	4090.34	0.52	4.13	1.00

The Effects of Age on Regular Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	19	145.26	54.10	35 - 44	110	143.62	60.65	1.64	1.000	59.77	3394.30	0.03	-1.65	0.05
< 35	19	145.26	54.10	45 - 54	193	138.74	55.41	6.52	0.993	55.30	3394.30	0.11	-0.24	0.41
< 35	19	145.26	54.10	55 - 64	125	149.66	59.31	-4.40	0.999	58.68	3394.30	-0.08	-1.06	0.14
< 35	19	145.26	54.10	65 +	28	120.39	65.52	24.87	0.724	61.21	3394.30	0.43	0.83	0.80
35 - 44	110	143.62	60.65	45 - 54	193	138.74	55.41	4.88	0.968	57.36	3394.30	0.08	-0.48	0.32
35 - 44	110	143.62	60.65	55 - 64	125	149.66	59.31	-6.04	0.960	59.94	3394.30	-0.10	-0.42	0.34
35 - 44	110	143.62	60.65	65 +	28	120.39	65.52	23.23	0.472	61.65	3394.30	0.40	2.47	0.99
45 - 54	193	138.74	55.41	55 - 64	125	149.66	59.31	-10.92	0.588	56.97	3394.30	-0.19	1.46	0.93
45 - 54	193	138.74	55.41	65 +	28	120.39	65.52	18.35	0.673	56.75	3394.30	0.31	2.85	1.00
55 - 64	125	149.66	59.31	65 +	28	120.39	65.52	29.27	0.218	60.47	3394.30	0.50	4.03	1.00

The Effects of Age on On Call Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	19	13.53	19.30	35 - 44	110	20.06	25.11	-6.53	0.843	24.37	492.74	-0.29	1.08	0.86
< 35	19	13.53	19.30	45 - 54	193	16.68	23.68	-3.15	0.988	23.34	492.74	-0.14	0.01	0.50
< 35	19	13.53	19.30	55 - 64	125	11.67	18.29	1.86	1.000	18.42	492.74	0.08	-0.75	0.23
< 35	19	13.53	19.30	65 +	28	7.71	11.63	5.82	0.942	15.17	492.74	0.26	0.67	0.75
35 - 44	110	20.06	25.11	45 - 54	193	16.68	23.68	3.38	0.790	24.21	492.74	0.15	0.47	0.68
35 - 44	110	20.06	25.11	55 - 64	125	11.67	18.29	8.39	0.119	21.75	492.74	0.38	3.95	1.00
35 - 44	110	20.06	25.11	65 +	28	7.71	11.63	12.35	0.143	23.07	492.74	0.56	4.33	1.00
45 - 54	193	16.68	23.68	55 - 64	125	11.67	18.29	5.01	0.555	21.72	492.74	0.23	2.15	0.98
45 - 54	193	16.68	23.68	65 +	28	7.71	11.63	8.97	0.417	22.55	492.74	0.40	3.95	1.00
55 - 64	125	11.67	18.29	65 +	28	7.71	11.63	3.96	0.919	17.29	492.74	0.18	0.87	0.81

The Effects of Age on Hours Worked for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	19	44.95	5.02	35 - 44	110	50.24	11.12	-5.29	0.460	10.47	124.94	-0.47	3.78	1.00
< 35	19	44.95	5.02	45 - 54	193	49.65	10.44	-4.70	0.562	10.09	124.94	-0.42	4.82	1.00
< 35	19	44.95	5.02	55 - 64	125	49.56	10.86	-4.61	0.610	10.30	124.94	-0.41	3.41	1.00
< 35	19	44.95	5.02	65 +	28	45.93	18.64	-0.98	0.999	14.78	124.94	-0.09	-1.51	0.07
35 - 44	110	50.24	11.12	45 - 54	193	49.65	10.44	0.59	0.993	10.69	124.94	0.05	-1.00	0.16
35 - 44	110	50.24	11.12	55 - 64	125	49.56	10.86	0.68	0.991	10.98	124.94	0.06	-1.01	0.16
35 - 44	110	50.24	11.12	65 +	28	45.93	18.64	4.31	0.507	12.96	124.94	0.39	1.95	0.97
45 - 54	193	49.65	10.44	55 - 64	125	49.56	10.86	0.09	0.100	10.61	124.94	0.01	-1.81	0.04
45 - 54	193	49.65	10.44	65 +	28	45.93	18.64	3.72	0.625	11.76	124.94	0.33	2.74	1.00
55 - 64	125	49.56	10.86	65 +	28	45.93	18.64	3.63	0.682	12.61	124.94	0.32	1.60	0.95

The Effects of Age on Visits per Hour for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 35	19	3.53	1.09	35 - 44	110	3.31	1.36	0.22	0.977	1.33	1.66	0.17	-0.07	0.47
< 35	19	3.53	1.09	45 - 54	193	3.22	1.26	0.31	0.901	1.25	1.66	0.24	1.66	0.95
< 35	19	3.53	1.09	55 - 64	125	3.26	1.29	0.27	0.950	1.27	1.66	0.21	0.60	0.73
< 35	19	3.53	1.09	65 +	28	2.88	1.37	0.65	0.586	1.27	1.66	0.50	1.56	0.94
35 - 44	110	3.31	1.36	45 - 54	193	3.22	1.26	0.09	0.980	1.30	1.66	0.07	-0.75	0.23
35 - 44	110	3.31	1.36	55 - 64	125	3.26	1.29	0.05	0.999	1.32	1.66	0.04	-1.38	0.08
35 - 44	110	3.31	1.36	65 +	28	2.88	1.37	0.43	0.655	1.36	1.66	0.33	1.75	0.96
45 - 54	193	3.22	1.26	55 - 64	125	3.26	1.29	-0.04	0.998	1.27	1.66	-0.03	-1.40	0.08
45 - 54	193	3.22	1.26	65 +	28	2.88	1.37	0.34	0.814	1.27	1.66	0.26	2.01	0.98
55 - 64	125	3.26	1.29	65 +	28	2.88	1.37	0.38	0.741	1.30	1.66	0.29	1.64	0.95

Table 4.3.2b presents the mean scores for the effects of age on male GP/FP output of services. The analysis could not confirm any of the apparent differences presented in Figure 4.3.2b for any of the output measures. Despite notable differences in mean scores, none of the null hypotheses could be rejected for male respondents on the basis of age.

4.3.3 The Effects of Payment Method on GP/FP Output

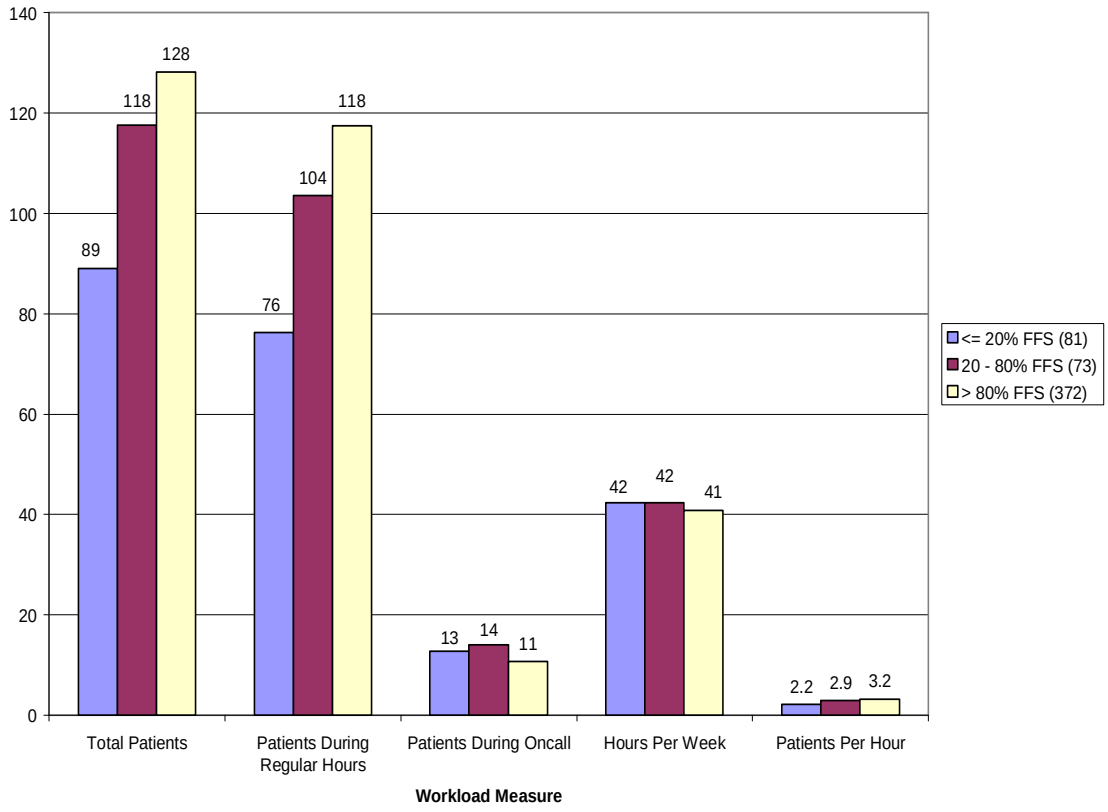

Figure 4.3.3a – The Effect of Payment Method on Output for Female GP/FPs

The trends uncovered in the analysis with regard to the effect of payment method (see Figure 4.3.3a) suggest differences in output levels exist between physicians who are remunerated through different schemes. Female respondents who received less than 20% of their remuneration through fee for service (FFS) payments reported 30% fewer *total visits* than their colleagues who received at least 80% FFS, and 25% fewer than those who received 20%-80% FFS. The differences were even more substantial (36% and 27%) with regard to the *regular visits* measure.

In contrast, payment method did not substantially affect *on call visits* or *hours worked*. It did, however, appear to influence the number of patient visits a female respondent conducts over the course of an hour – more FFS remuneration seems was associated with higher throughput rates. The statistical significance of these trends are presented in Table 4.3.3a below.

Table 4.3.3a – The Effect of Payment Method on Output for Female GP/FPs

The Effects of Payment Method on Total Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	**81**	**89.07**	**44.47**	**20-80% FFS**	**73**	**117.59**	**52.79**	**-28.52**	**0.004**	**48.59**	**276.31**	**-1.72**	**5.32**	**1.00**
< 20% FFS	**81**	**89.07**	**44.47**	**>80% FFS**	**370**	**128.28**	**54.41**	**-39.21**	**0.000**	**52.78**	**276.31**	**-2.36**	**13.78**	**1.00**
20-80% FFS	73	117.59	52.79	>80% FFS	370	128.28	54.41	-10.69	0.292	54.15	276.31	-0.64	2.19	0.99

The Effects of Payment Method on Regular Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	**81**	**76.28**	**33.32**	**20-80% FFS**	**73**	**103.56**	**45.32**	**-27.28**	**0.002**	**39.46**	**2246.71**	**-0.58**	**6.62**	**1.00**
< 20% FFS	**81**	**76.28**	**33.32**	**>80% FFS**	**370**	**117.55**	**50.42**	**-41.27**	**0.000**	**47.82**	**2246.71**	**-0.87**	**16.33**	**1.00**
20-80% FFS	73	103.56	45.32	>80% FFS	370	117.55	50.42	-13.99	0.072	49.62	2246.71	-0.30	3.96	1.00

The Effects of Payment Method on On Call Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	81	12.79	23.84	20-80% FFS	73	14.03	21.48	-1.24	0.931	22.75	413.35	-0.06	-1.28	0.10
< 20% FFS	81	12.79	23.84	>80% FFS	370	10.73	19.29	2.06	0.698	20.18	413.35	0.10	0.20	0.58
20-80% FFS	73	14.03	21.48	>80% FFS	370	10.73	19.29	3.30	0.437	19.66	413.35	0.16	1.56	0.94

The Effects of Payment Method on Hours Worked for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	81	42.27	12.16	20-80% FFS	73	42.37	11.42	-0.10	0.999	11.82	146.11	-0.01	-1.85	0.03
< 20% FFS	81	42.27	12.16	>80% FFS	370	40.71	12.21	1.56	0.584	12.20	146.11	0.13	0.75	0.77
20-80% FFS	73	42.37	11.42	>80% FFS	370	40.71	12.21	1.66	0.572	12.08	146.11	0.14	0.92	0.82

The Effects of Payment Method on Visits per Hour for Female Physicians													
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	**81**	**2.16**	**0.99**	**20-80% FFS**	**73**	**2.88**	**1.28**	**-0.72**	**0.001**	**1.14**	**1.40**	**-0.61**	**5.90**	**1.00**
< 20% FFS	**81**	**2.16**	**0.99**	**>80% FFS**	**370**	**3.21**	**1.20**	**-1.05**	**0.000**	**1.17**	**1.40**	**-0.89**	**17.13**	**1.00**
20-80% FFS	73	2.88	1.28	>80% FFS	370	3.21	1.20	-0.33	0.111	1.21	1.40	-0.28	3.75	1.00

The results of the one way analyses (Table 4.3.2a) confirm the trends apparent in Figure 4.3.3a. Female respondents in the <20% FFS group conducted significantly fewer *total visits*, and *regular visits* than respondents who were remunerated more substantially through FFS. The same group conducted significantly fewer *visits per hour* than the other two groups. No differences between any groups were found on the basis of *on call visits* or *hours worked*. The analysis was also unable to confirm statistically significant differences between the > 80% FFS group and the 20-80% FFS group, despite substantial differences in reported mean output levels in several categories.

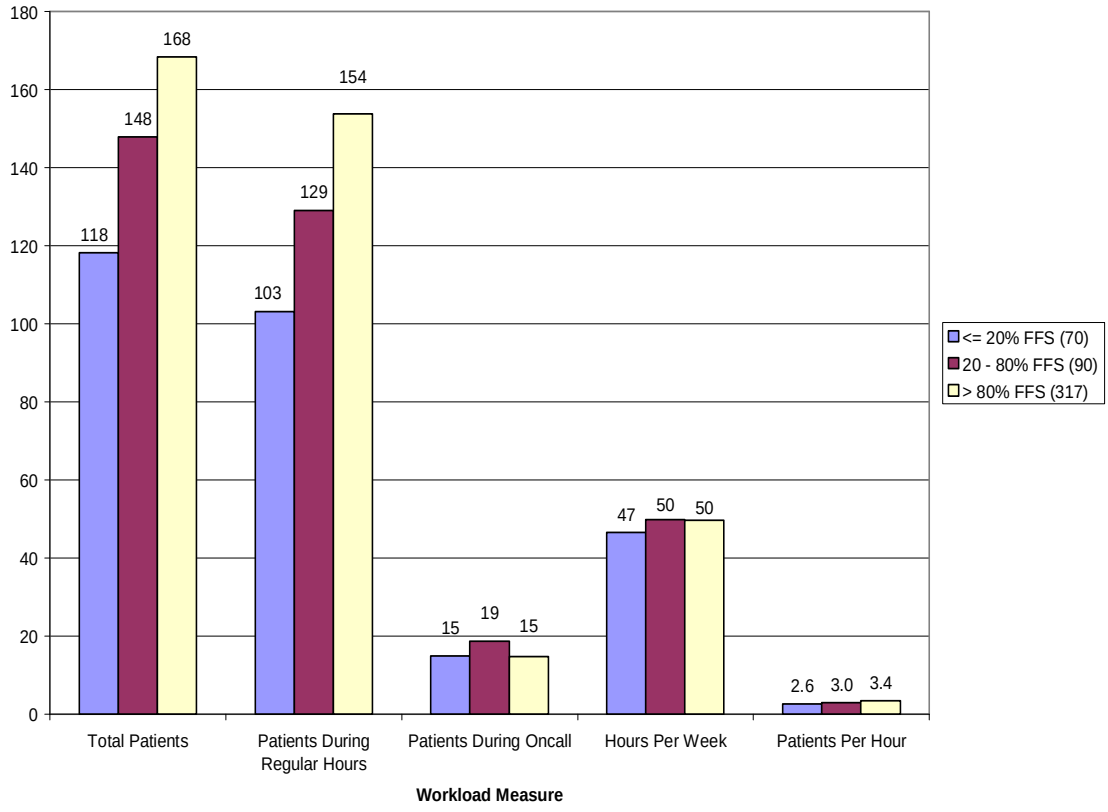

Figure 4.3.3b – The Effect of Payment Method on Output for Male GP/FPs

The trends with respect to the effect of payment method on output for male GP/FPs (Figure 4.3.3b) appear to follow those for females. Once again, respondents in the <20% FFS group reported substantially lower mean output levels than respondents in the 20-80% group and the >80% group. Those remunerated least through FFS reported 50 fewer *total visits* and 51 fewer *regular visits* than their colleagues in the

>80% group. The former also reported conducting 30 fewer *total visits* and 26 fewer *regular visits* than respondents in the 20-80% group.

Once again, differences in *on call visits* and *hours worked* did not vary substantially between groups, though respondents in the 20-80% FFS group reported slightly higher *on call visits* than respondents in the other two groups. The *visits per hour* measure for males followed the trend of their female colleagues – a higher percentage of FFS appears to have led to faster patient throughput. The statistical significance of these apparent trends is presented in Table 4.3.3b below.

Table 4.3.3b – The Effect of Payment Method on Output for Male GP/FPs

The Effects of Payment Method on Total Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	**70**	**118.2**	**51.96**	**20-80% FFS**	**90**	**147.92**	**60.85**	**-29.72**	**0.011**	**57.14**	**3812.13**	**-0.48**	**4.62**	**1.00**
< 20% FFS	**70**	**118.2**	**51.96**	**>80% FFS**	**317**	**168.37**	**63.92**	**-50.17**	**0.000**	**61.95**	**3812.13**	**-0.81**	**13.93**	**1.00**
20-80% FFS	**90**	**147.92**	**60.85**	**>80% FFS**	**317**	**168.37**	**63.92**	**-20.45**	**0.022**	**63.26**	**3812.13**	**-0.33**	**4.55**	**1.00**

The Effects of Payment Method on Regular Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	**70**	**103.21**	**39.24**	**20-80% FFS**	**90**	**129.14**	**48.69**	**-25.93**	**0.014**	**44.81**	**3079.13**	**-0.47**	**5.36**	**1.00**
< 20% FFS	**70**	**103.21**	**39.24**	**>80% FFS**	**317**	**153.77**	**60.13**	**-50.56**	**0.000**	**56.95**	**3079.13**	**-0.91**	**15.46**	**1.00**
20-80% FFS	**90**	**129.14**	**48.69**	**>80% FFS**	**317**	**153.77**	**60.13**	**-24.63**	**0.001**	**57.81**	**3079.13**	**-0.44**	**6.61**	**1.00**

The Effects of Payment Method on On Call Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	70	14.99	26.47	20-80% FFS	90	18.78	28.92	-3.79	0.568	27.88	499.39	-0.17	-0.24	0.05
< 20% FFS	70	14.99	26.47	>80% FFS	317	14.60	18.72	0.39	0.998	20.33	499.39	0.02	-1.58	0.06
20-80% FFS	90	18.78	28.92	>80% FFS	317	14.60	18.72	4.18	0.328	21.38	499.39	0.19	1.97	0.98

The Effects of Payment Method on Hours Worked for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	70	46.56	9.77	20-80% FFS	90	49.94	10.60	-3.38	0.165	10.25	124.73	-0.30	2.21	0.99
< 20% FFS	70	46.56	9.77	>80% FFS	317	49.80	11.63	-3.24	0.096	11.32	124.73	-0.29	3.66	1.00
20-80% FFS	90	49.94	10.60	>80% FFS	317	49.80	11.63	0.14	0.990	11.41	124.73	0.01	-1.71	0.04

The Effects of Payment Method on Visits per Hour for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
< 20% FFS	70	2.61	1.15	20-80% FFS	90	3.01	1.25	-0.40	0.131	1.21	1.57	-0.32	2.23	0.99
< 20% FFS	**70**	**2.61**	**1.15**	**>80% FFS**	**317**	**3.44**	**1.28**	**-0.83**	**0.000**	**1.26**	**1.57**	**-0.66**	**10.99**	**1.00**
20-80% FFS	**90**	**3.01**	**1.25**	**>80% FFS**	**317**	**3.44**	**1.28**	**-0.43**	**0.017**	**1.27**	**1.57**	**-0.34**	**4.84**	**1.00**

Table 4.3.3b confirms many of the trends suggested in Figure 4.3.3b. With respect to *total visits*, *regular visits*, and *visits per hour*, male respondents in all three payment categories differed significantly from one another. As fee for service remuneration increased, output as measured by these three variables also increased. In addition, respondents who received less than 20% of their remuneration through fee for service reported fewer *hours worked* than their colleagues who received a greater percentage of FFS. There was no difference in *hours worked*, however, between the 20-80% group and the >80% group.

4.3.4 The Effect of Practice Size on GP/FP Output

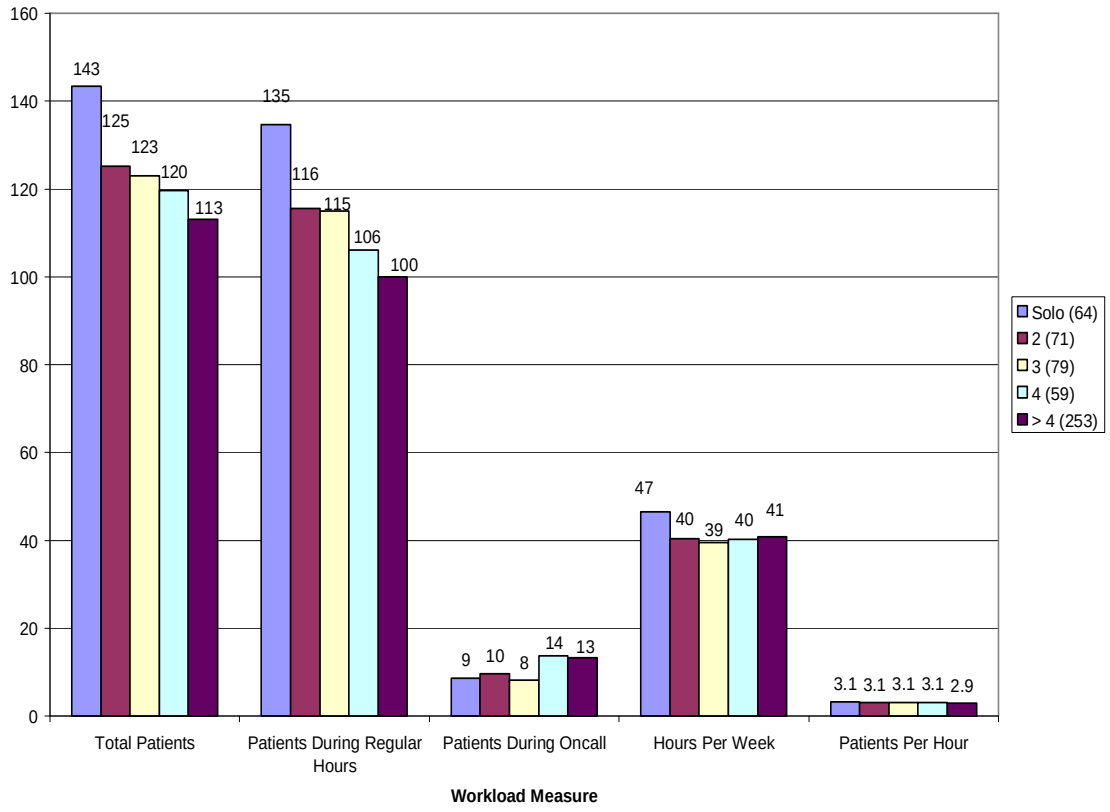

Figure 4.3.4a – The Effect of Practice Size on Output for Female GP/FPs

The analysis also suggested trends with regard to the effect of practice size on output. Mean output scores for female GP/FPs (Figure 4.3.4a) seemed to be associated with the number of physicians in the practice. For the *total visits* and *regular visits* measures, levels of output appeared to drop as the number of physicians increased.

Specifically, scores started at 143 *total visits* and 135 *regular visits* for solo practitioners and declined steadily to 113 *total visits* and 100 *regular visits* for physicians who practiced in groups of five or more. The most notable decrease was between solo practice respondents and respondents who practiced with one partner. Differences were less substantial between respondents who practiced with at least two other physicians.

The remaining three measures of output were not substantially associated with the number of physicians in the practice. With regard to *on call visits* there appeared to be a slight upward trend as the number of physicians increased. Of responding female GP/FPs, solo practitioners reported the most *hours worked*, but the remaining four groups reported almost identical means. *Visits per hour* scores appear almost identical for all groups. Table 4.3.4a below presents the statistical validity of these trends.

Table 4.3.4a – The Effect of Practice Size on Output for Female GP/FPs

The Effects of Group Size on Total Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	63	144.05	68.30	Two	71	125.21	56.17	18.84	0.430	62.16	2889.71	0.35	1.55	0.94
Solo	63	144.05	68.30	Three	79	123.01	51.62	21.04	0.282	59.59	2889.71	0.39	2.25	0.99
Solo	63	144.05	68.30	Four	59	119.71	48.69	24.34	0.205	59.63	2889.71	0.45	2.55	0.99
Solo	**63**	**144.05**	**68.30**	**Five +**	**252**	**113.17**	**50.82**	**30.88**	**0.003**	**54.73**	**2889.71**	**0.57**	**8.05**	**1.00**
Two	71	125.21	56.17	Three	79	123.01	51.62	2.20	1.000	53.82	2889.71	0.04	-1.46	0.07
Two	71	125.21	56.17	Four	59	119.71	48.69	5.50	0.987	52.91	2889.71	0.10	-0.77	0.22
Two	71	125.21	56.17	Five +	252	113.17	50.82	12.04	0.597	52.03	2889.71	0.22	2.20	0.99
Three	79	123.01	51.62	Four	59	119.71	48.69	3.30	0.998	50.39	2889.71	0.06	-1.19	0.12
Three	79	123.01	51.62	Five +	252	113.17	50.82	9.84	0.734	51.01	2889.71	0.18	1.55	0.94
Four	59	119.71	48.69	Five +	252	113.17	50.82	6.54	0.951	50.43	2889.71	0.12	0.33	0.63

The Effects of Group Size on Regular Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	63	135.24	63.47	Two	71	115.65	52.97	19.59	0.268	58.14	2344.45	0.40	1.94	0.97
Solo	63	135.24	63.47	Three	79	114.91	50.07	20.33	0.209	56.40	2344.45	0.42	2.34	0.99
Solo	**63**	**135.24**	**63.47**	**Four**	**59**	**106.05**	**39.86**	**29.19**	**0.031**	**53.38**	**2344.45**	**0.60**	**4.08**	**1.00**
Solo	**63**	**135.24**	**63.47**	**Five +**	**252**	**99.87**	**44.00**	**35.37**	**0.000**	**48.48**	**2344.45**	**0.73**	**10.99**	**1.00**
Two	71	115.65	52.97	Three	79	114.91	50.07	0.74	1.000	51.46	2344.45	0.02	-1.78	0.04
Two	71	115.65	52.97	Four	59	106.05	39.86	9.60	0.867	47.48	2344.45	0.20	0.35	0.64
Two	71	115.65	52.97	Five +	252	99.87	44.00	15.78	0.214	46.11	2344.45	0.33	4.19	1.00
Three	79	114.91	50.07	Four	59	106.05	39.86	8.86	0.889	45.99	2344.45	0.18	0.30	0.62
Three	79	114.91	50.07	Five +	252	99.87	44.00	15.04	0.220	45.51	2344.45	0.31	4.05	1.00
Four	59	106.05	39.86	Five +	252	99.87	44.00	6.18	0.944	43.25	2344.45	0.13	0.56	0.71

The Effects of Group Size on On Call Visits for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	63	8.81	16.25	Two	71	9.56	13.23	-0.75	0.999	14.73	411.33	-0.04	-1.37	0.09
Solo	63	8.81	16.25	Three	79	8.10	13.32	0.71	1.000	14.69	411.33	0.04	-1.38	0.08
Solo	63	8.81	16.25	Four	59	13.66	27.17	-4.85	0.762	22.21	411.33	-0.24	0.45	0.67
Solo	63	8.81	16.25	Five +	252	13.30	22.65	-4.49	0.628	21.53	411.33	-0.22	1.74	0.96
Two	71	9.56	13.23	Three	79	8.10	13.32	1.46	0.996	13.28	411.33	0.07	-0.61	0.73
Two	71	9.56	13.23	Four	59	13.66	27.17	-4.10	0.859	20.74	411.33	-0.20	0.29	0.61
Two	71	9.56	13.23	Five +	252	13.30	22.65	-3.74	0.767	20.96	411.33	-0.18	1.25	0.89
Three	79	8.10	13.32	Four	59	13.66	27.17	-5.56	0.638	20.41	411.33	-0.27	1.24	0.89
Three	79	8.10	13.32	Five +	252	13.30	22.65	-5.20	0.425	20.82	411.33	-0.26	2.58	1.00
Four	59	13.66	27.17	Five +	252	13.30	22.65	0.36	1.000	23.56	411.33	0.02	-1.69	0.05

The Effects of Group Size on Hours Worked for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	63	46.44	12.06	Two	71	40.37	12.55	6.07	0.064	12.32	142.99	0.51	3.74	1.00
Solo	**63**	**46.44**	**12.06**	**Three**	**79**	**39.47**	**10.23**	**6.97**	**0.016**	**11.08**	**142.99**	**0.58**	**5.54**	**1.00**
Solo	63	46.44	12.06	Four	59	40.25	10.66	6.19	0.078	11.40	142.99	0.52	4.03	1.00
Solo	**63**	**46.44**	**12.06**	**Five +**	**252**	**40.85**	**12.57**	**5.59**	**0.022**	**12.47**	**142.99**	**0.47**	**6.00**	**1.00**
Two	71	40.37	12.55	Three	79	39.47	10.23	0.90	0.995	11.39	142.99	0.08	-0.99	0.16
Two	71	40.37	12.55	Four	59	40.25	10.66	0.12	1.000	11.73	142.99	0.01	-1.84	0.03
Two	71	40.37	12.55	Five +	252	40.85	12.57	-0.48	0.999	12.57	142.99	-0.04	-1.27	0.10
Three	79	39.47	10.23	Four	59	40.25	10.66	-0.78	0.997	10.42	142.99	-0.07	-1.08	0.14
Three	79	39.47	10.23	Five +	252	40.85	12.57	-1.38	0.939	12.06	142.99	-0.12	0.12	0.55
Four	59	40.25	10.66	Five +	252	40.85	12.57	-0.60	0.998	12.23	142.99	-0.05	-1.10	0.14

The Effects of Group Size on Visits per Hour for Female Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	63	3.16	1.52	Two	71	3.07	1.04	0.09	0.999	1.29	1.54	0.07	-1.15	0.13
Solo	63	3.16	1.52	Three	79	3.10	1.04	0.06	1.000	1.28	1.54	0.05	-1.40	0.08
Solo	63	3.16	1.52	Four	59	3.09	1.41	0.07	1.000	1.47	1.54	0.06	-1.43	0.08
Solo	63	3.16	1.52	Five +	252	2.89	1.23	0.27	0.733	1.29	1.54	0.22	1.75	0.96
Two	71	3.07	1.04	Three	79	3.10	1.04	-0.03	1.000	1.04	1.54	-0.02	-1.61	0.05
Two	71	3.07	1.04	Four	59	3.09	1.41	-0.02	1.000	1.22	1.54	-0.02	-1.77	0.04
Two	71	3.07	1.04	Five +	252	2.89	1.23	0.18	0.882	1.19	1.54	0.15	0.76	0.78
Three	79	3.10	1.04	Four	59	3.09	1.41	0.01	1.000	1.21	1.54	0.01	-1.86	0.03
Three	79	3.10	1.04	Five +	252	2.89	1.23	0.21	0.785	1.19	1.54	0.17	1.26	0.90
Four	59	3.09	1.41	Five +	252	2.89	1.23	0.20	0.878	1.27	1.54	0.16	0.83	0.80

The trends seen in the data (Figure 4.3.4a) were not substantially supported by the statistical analysis. Only three significant differences between practice sizes were identified for female respondents. Solo practitioners conducted statistically more *total visits* than physicians who worked in settings of five or more physicians. Solo practitioners also saw more patients during regular hours than physicians in practice settings of four or more. Finally, female solo practitioners worked more hours per week than their colleagues in any other category. No other statistically relevant differences were uncovered in the analysis of female GP/FPs.

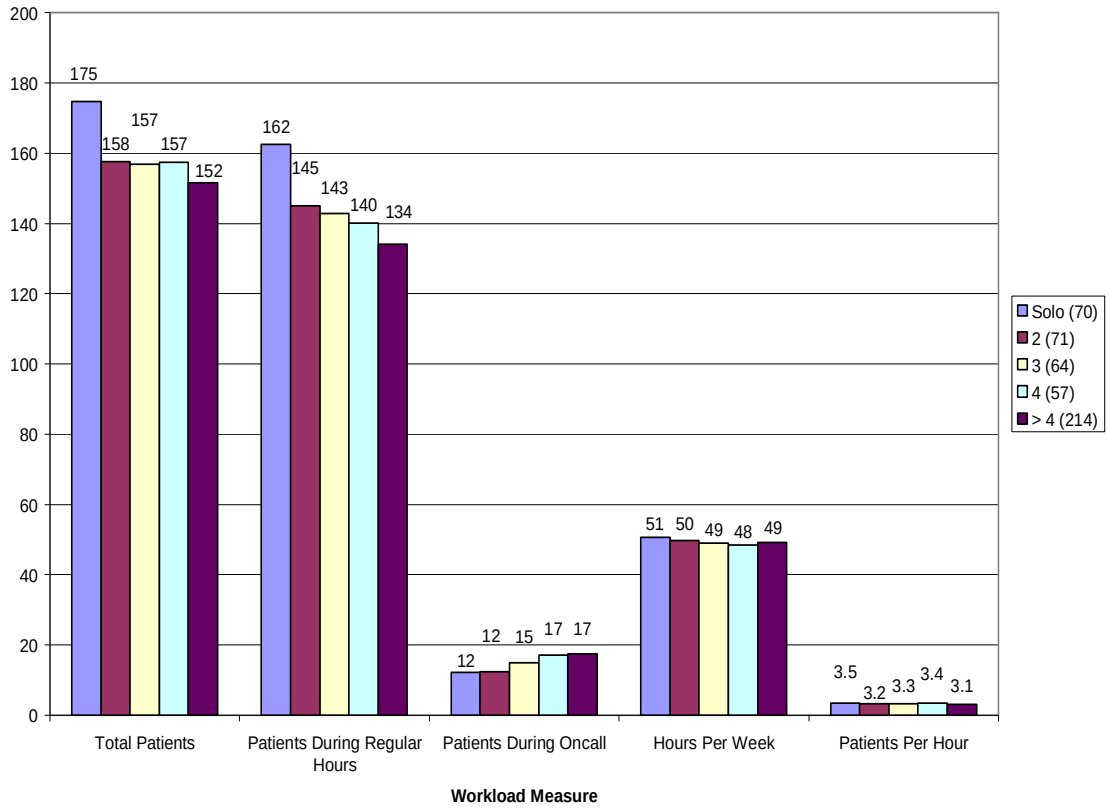

Figure 4.3.4b – The Effect of Practice Size on Output for Male GP/FPs

Based on the trends in the data (Figure 4.3.4b) the relationship between practice size and output was not as apparent among male respondents as females. Like the female respondents, *total visits* and *regular visits* appeared to drop off considerably when moving from solo practitioners to physicians with at least one practice partner. In the case of *total visits*, however, there were no substantial differences between the 2, 3, 4, and 5+ physician groups. The inverse relationship between output and practice size

was slightly more apparent in the case of the *regular visits* measure, but the clear difference appeared to be between solo practitioners and all other groups.

Similar to the female trends, there appeared to be a slight positive relationship between *on call visits* and practice size. As practice size increased, the number of patients an individual GP/FP tended to while on call appears to increase as well. There was virtually no difference in *hours worked* on the basis of practice size, while *visits per hour* fell from 3.5 for solo practitioners to 3.1 for physicians in groups of 5 or more. The statistical differences are presented in Table 4.3.4b.

Table 4.3.4b – The Effect of Practice Size on Output for Male GP/FPs

The Effects of Group Size on Total Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	70	174.74	68.13	Two	70	158.34	61.35	16.40	0.639	64.83	4091.09	0.26	1.03	0.85
Solo	70	174.74	68.13	Three	64	156.86	53.79	17.88	0.625	61.70	4091.09	0.28	1.39	0.92
Solo	70	174.74	68.13	Four	57	157.44	59.78	17.30	0.681	64.52	4091.09	0.27	1.06	0.86
Solo	70	174.74	68.13	Five +	214	151.60	67.19	23.14	0.143	67.42	4091.09	0.36	3.82	1.00
Two	70	158.34	61.35	Three	64	156.86	53.79	1.48	1.000	57.87	4091.09	0.02	-1.66	0.05
Two	70	158.34	61.35	Four	57	157.44	59.78	0.90	1.000	60.65	4091.09	0.01	-1.79	0.04
Two	70	158.34	61.35	Five +	214	151.60	134.14	6.74	0.976	120.46	4091.09	0.11	-1.02	0.15
Three	64	156.86	53.79	Four	57	157.44	59.78	-0.58	1.000	56.69	4091.09	-0.01	-1.85	0.03
Three	64	156.86	53.79	Five +	214	151.60	134.14	5.26	0.988	120.61	4091.09	0.08	-1.23	0.11
Four	57	157.44	59.78	Five +	214	151.60	134.14	5.84	0.984	122.44	4091.09	0.09	-1.17	0.12

The Effects of Group Size on Regular Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	70	162.44	62.46	Two	70	145.76	56.66	16.68	0.532	59.63	3347.36	0.29	1.35	0.91
Solo	70	162.44	62.46	Three	64	142.86	50.66	19.58	0.430	57.13	3347.36	0.34	2.01	0.98
Solo	70	162.44	62.46	Four	57	140.18	50.35	22.26	0.326	57.35	3347.36	0.38	2.41	0.99
Solo	**70**	**162.44**	**62.46**	**Five +**	**214**	**134.14**	**60.52**	**28.30**	**0.014**	**61.00**	**3347.36**	**0.49**	**5.86**	**1.00**
Two	70	145.76	56.66	Three	64	142.86	50.66	2.90	1.000	53.88	3347.36	0.05	-1.34	0.09
Two	70	145.76	56.66	Four	57	140.18	50.35	5.58	0.994	53.92	3347.36	0.10	-0.79	0.21
Two	70	145.76	56.66	Five +	214	134.14	60.52	11.62	0.751	59.60	3347.36	0.20	1.33	0.91
Three	64	142.86	50.66	Four	57	140.18	50.35	2.68	0.999	50.51	3347.36	0.05	-1.38	0.08
Three	64	142.86	50.66	Five +	214	134.14	60.52	8.72	0.891	58.42	3347.36	0.15	0.53	0.70
Four	57	140.18	50.35	Five +	214	134.14	60.52	6.04	0.974	58.55	3347.36	0.10	-0.26	0.40

The Effects of Group Size on On Call Visits for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	70	12.30	17.42	Two	70	12.56	15.33	-0.26	1.000	16.41	499.66	-0.01	-1.77	0.04
Solo	70	12.30	17.42	Three	64	14.00	18.53	-1.70	0.974	17.96	499.66	-0.08	-0.86	0.19
Solo	70	12.30	17.42	Four	57	17.26	24.78	-4.96	0.827	21.04	499.66	-0.22	0.70	0.76
Solo	70	12.30	17.42	Five +	214	17.46	25.53	-5.16	0.591	23.80	499.66	-0.23	1.69	0.95
Two	70	12.56	15.33	Three	64	14.00	18.53	-1.44	0.979	16.93	499.66	-0.06	-0.98	0.16
Two	70	12.56	15.33	Four	57	17.26	24.78	-4.70	0.845	20.12	499.66	-0.21	0.67	0.75
Two	70	12.56	15.33	Five +	214	17.46	25.53	-4.90	0.619	23.45	499.66	-0.22	1.56	0.94
Three	64	14.00	18.53	Four	57	17.26	24.78	-3.26	0.991	21.70	499.66	-0.15	-0.31	0.38
Three	64	14.00	18.53	Five +	214	17.46	25.53	-3.46	0.963	24.11	499.66	-0.15	0.43	0.67
Four	57	17.26	24.78	Five +	214	17.46	25.53	-0.20	1.000	25.38	499.66	-0.01	-1.83	0.03

The Effects of Group Size on Hours Worked for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	70	50.70	10.52	Two	70	49.57	10.82	1.13	0.992	10.67	126.06	0.10	-0.71	0.24
Solo	70	50.70	10.52	Three	64	49.17	12.14	1.53	0.949	11.32	126.06	0.14	-0.40	0.34
Solo	70	50.70	10.52	Four	57	48.53	10.78	2.17	0.869	10.64	126.06	0.19	0.34	0.63
Solo	70	50.70	10.52	Five +	214	49.12	11.45	1.58	0.903	11.23	126.06	0.14	0.41	0.66
Two	70	49.57	10.82	Three	64	49.17	12.14	0.40	0.998	11.47	126.06	0.04	-1.56	0.06
Two	70	49.57	10.82	Four	57	48.53	10.78	1.04	0.983	10.80	126.06	0.09	-0.88	0.19
Two	70	49.57	10.82	Five +	214	49.12	11.45	0.45	0.997	11.30	126.06	0.04	-1.29	0.10
Three	64	49.17	12.14	Four	57	48.53	10.78	0.64	0.999	11.52	126.06	0.06	-1.35	0.09
Three	64	49.17	12.14	Five +	214	49.12	11.45	0.05	1.000	11.61	126.06	0.00	-1.89	0.03
Four	57	48.53	10.78	Five +	214	49.12	11.45	-0.59	0.997	11.31	126.06	-0.05	-1.10	0.14

The Effects of Group Size on Visits per Hour for Male Physicians														
Group 1				Group 2				Mean Dif.	Sig.	Pooled Std.	MSE	Cohen's d	Zbeta	Power
Category	n	Mean	Std.	Category	n	Mean	Std.							
Solo	70	3.48	1.36	Two	70	3.26	1.34	0.22	0.883	1.35	1.66	0.17	-0.03	0.49
Solo	70	3.48	1.36	Three	64	3.27	1.05	0.21	0.928	1.22	1.66	0.16	0.03	0.51
Solo	70	3.48	1.36	Four	57	3.35	1.32	0.13	0.988	1.34	1.66	0.10	-0.87	0.19
Solo	70	3.48	1.36	Five +	214	3.12	1.30	0.36	0.411	1.31	1.66	0.28	2.65	1.00
Two	70	3.26	1.34	Three	64	3.27	1.05	-0.01	1.000	1.21	1.66	-0.01	-1.86	0.03
Two	70	3.26	1.34	Four	57	3.35	1.32	-0.09	0.995	1.33	1.66	-0.07	-1.20	0.12
Two	70	3.26	1.34	Five +	214	3.12	1.30	0.14	0.978	1.31	1.66	0.11	-0.16	0.44
Three	64	3.27	1.05	Four	57	3.35	1.32	-0.08	0.999	1.18	1.66	-0.06	-1.22	0.11
Three	64	3.27	1.05	Five +	214	3.12	1.30	0.15	0.960	1.25	1.66	0.12	0.05	0.52
Four	57	3.35	1.32	Five +	214	3.12	1.30	0.23	0.854	1.30	1.66	0.18	0.94	0.83

Based on the Scheffe post hoc analyses presented in Table 4.3.4b, practice size had little statistically significant association with output. Only one significant difference was identified: male physicians in solo practice conducted significantly more *regular visits* than their male counterparts in practices numbering five or more. Despite the appearance of meaningful trends, the statistical analysis was unable to find any additional significant differences.

4.4 Regression Analyses

4.4.1 Contribution of Gender to Output of GP/FP Services

Formula: $Y = \beta_0 + \beta_1 Gender$

Table 4.4.1 – Regression Model for Gender vs. Output

Model for Gender vs. Output Measures				
Dependent Variable	**% Var. Explained (Adj. R^2)**	**Standardized Beta**	**Sig.**	**Relationship**
Total Patients / Week	8.5	0.294	0.000	Male > Female
Patients / Week – Regular Hours	8.2	0.288	0.000	Male > Female
Patients / Week – On Call	0.8	0.096	0.002	Male > Female
Hours Worked / Week	10.7	0.329	0.000	Male > Female
Patients / Hour Worked	0.8	0.094	0.003	Male > Female

Table 4.4.1 depicts the regression relationship between gender and the five dependent output variables. As indicated by the column labeled 'Sig.', the explanation of variance contributed by gender was significant for all five output measures. It appeared as though gender was best able to explain variance in *hours worked*, *total visits*, and *regular visits*, at 10.7, 8.5, and 8.2 per cent respectively. Though significantly contributing to *on call visits*, and *visits per hour*, gender explained only 0.8 per cent of the variance in each of those variables.

This analysis provided sufficient evidence to reject the null hypotheses that gender would make no contribution to the variance in output. Based on this evidence, one can conclude that gender significantly contributed to the explanation of variance in all five output measures.

The standardized beta values (Table 4.4.1) present the slope of the relationship between gender and the five output measures. All of the values presented indicate

moderate to weak relationships (gentle slopes) between the two concepts, though the relationships between gender and *on call visits* and between gender and *visits per hour* were substantially weaker than the other three relationships presented.

4.4.2 Contribution of Age to Output of GP/FP Services

Formula: $Y = \beta_0 + \beta_1 Age$

Table 4.4.2 – Regression Model for Age vs. Output

Model for Age vs. Output Measures				
Dependent Variable	**% Var. Explained (Adj. R^2)**	**Standardized Beta**	**Sig.**	**Relationship**
Total Patients / Week	0.9	0.102	0.001	Positive
Patients / Week – Regular Hours	1.8	0.139	0.000	Positive
Patients / Week – On Call	0.4	-0.066	0.037	Positive
Hours Worked / Week	2.3	0.156	0.000	Positive
Patients / Hour Worked	-0.1	-0.006	0.846	None

As depicted in Table 4.4.2 above, age significantly explained variance in all but one output measure. Even so, the percentage of variance explained in each significant relationship was quite small – just 2.3, 1.8, 0.9, and 0.4 per cent of the variance in *hours worked*, *regular visits*, *total visits*, and *on call visits* respectively. The analysis did not find any statistically significant regression relationship between output and *visits per hour*.

This analysis provided sufficient evidence to reject the null hypotheses for the effects of age for all but one output measure. Age significantly contributed to explaining variance in output as measured by *total visits*, *regular visits*, *on call visits*, and *hours worked*. Age was not, however, significantly associated with *visits per hour* and so the null hypothesis specific to that measure could not be rejected.

The standardized beta values presented indicate weak relationships between age and all of the output measures. Once again, the relationship between age and *on call visits* was notably weaker than the remaining relationships.

4.4.3 Contribution of Payment Method to Output of GP/FP Services

Formula: $Y = \beta_0 + \beta_1 Pay$

Table 4.4.3 – Regression Model for Payment Method vs. Output

Model for Age vs. Output Measures				
Dependent Variable	**% Var. Explained (Adj. R^2)**	**Standardized Beta**	**Sig.**	**Relationship**
Total Patients / Week	6.6	0.260	0.000	Positive
Patients / Week – Regular Hours	9.0	0.301	0.000	Positive
Patients / Week – On Call	0.1	-0.039	0.218	None
Hours Worked / Week	-0.1	0.004	0.900	None
Patients / Hour Worked	7.6	0.278	0.000	Positive

Table 4.4.3, displayed above, presents the results of the regression analyses conducted between the independent variable 'payment method' – the percentage of remuneration received through fee-for-service payments – and the five dependent variables. In all but two measures (*regular visits* and *hours worked*) payment method made a statistically significant contribution to explaining the variance in output. The r^2 value for *regular visits* was highest at 9.0%. This was followed by *visits per hour* at 7.6% and *total visits* at 6.6%. This result suggested that as physicians received a greater percentage of their remuneration through fee-for-service, they conducted more *regular visits, total visits,* and *visits per hour.*

This analysis provided sufficient evidence to reject three of the five null hypotheses associated with the effects of payment method on output of physician services. With p-values greater than 0.05, the null hypotheses for the effects of payment method on *on call visits* and *hours worked* could not be rejected – no significant contribution was found. However, the effects of payment method on the remaining three output measures (*total visits*, *regular visits*, and *visits per hour*), as evidenced by their respective p-values, were highly significant. As such, the null hypotheses for each could be rejected and one can conclude that payment method significantly contributed to output as measured by these variables.

Once again the standardized beta scores displayed in Table 4.4.3 suggest moderate to weak relationships between payment method and the output measures. Payment method was most important in predicting *regular visits* followed by *visits per*

hour and *total visits*. Payment method was not significant in predicting *hours worked* or *on call visits.*

4.4.4 Contribution of Practice Size to Output of GP/FP Services

Formula: $Y = \beta_0 + \beta_1 PSize$

Table 4.4.4 – Regression Model for Practice Size vs. Output

Model for Age vs. Output Measures				
Dependent Variable	**% Var. Explained (Adj. R^2)**	**Standardized Beta**	**Sig.**	**Relationship**
Total Patients / Week	1.9	-0.140	0.000	Negative
Patients / Week – Regular Hours	3.5	-0.190	0.000	Negative
Patients / Week – On Call	0.7	0.092	0.004	Positive
Hours Worked / Week	0.5	-0.080	0.011	Negative
Patients / Hour Worked	0.6	-0.081	0.010	Negative

The results of regression procedures between the independent variable 'practice size' and the five output measures are presented in Table 4.4.4. As shown in the 'Sig.' column, practice size significantly contributed to explaining the variation in output in all five output measures. In each case, however, the magnitude of the contribution was small. Practice size explained 3.5% of the variance in *regular visits*, 1.9% in *total visits*, and less than one per cent in each of the remaining output measures.

The evidence was sufficient to reject the null hypotheses associated with the effects of practice size on GP/FP output. P-values for the effects of payment method on all output measures are below 0.05 and therefore sufficient to conclude that practice size was a statistically significant contributor to variance in output as measured by *total visits, regular visits, on call visits, hours worked*, and *visits per hour*.

All standardized beta scores reported in Table 4.4.4 indicate weak relationships between group size and the dependent output measures. *Regular visits* and *total visits* were the most responsive to differences in group size, but beta scores of -0.190 and -0.140 are not substantial.

4.4.5 Combined Contribution to Output of GP/FP Services

Formula: $Y = \beta_0 + \beta_1 Gender + \beta_2 Age + \beta_3 Pay + \beta_4 PSize$

Table 4.4.5a – Regression Model – Combined Model for Output

Model for Output of GP/FP Services				
Dependent Variable	**Independent Variable**	**Standardized Beta**	**Sig.**	**% Var. Explained (Adj. R^2)**
Total Patients / Week	Gender	0.301	0.000	16.3
	Age	-0.034	0.275	
	Payment Method	0.251	0.000	
	Group Size	-0.110	0.000	
Patients / Week – Regular Hours	Gender	0.282	0.000	19.4
	Age	0.002	0.942	
	Payment Method	0.285	0.000	
	Group Size	-0.153	0.000	
Patients / Week – On Call	Gender	0.133	0.000	2.4
	Age	-0.100	0.003	
	Payment Method	-0.022	0.493	
	Group Size	0.085	0.007	
Hours Worked / Week	Gender	0.312	0.000	11.1
	Age	0.046	0.152	
	Payment Method	-0.010	0.742	
	Group Size	-0.061	0.044	
Patients / Hour Worked	Gender	0.118	0.000	9.1
	Age	-0.078	0.016	
	Payment Method	0.280	0.000	
	Group Size	-0.062	0.043	

Table 4.4.5 presents the regression model for the combined effects of the four independent variables (gender, age, payment method, and group size) on each of the five output measures. The four independent variables combined to explain 19.4% of the variation in *regular visits*. This was the highest percentage of variance explained, followed by *total visits* (16.3%), *hours worked* (11.1%), *visits per hour* (9.1%), and *on call visits* (2.4%). Interestingly, in the two most complete models (*regular visits* and *total visits*) the contribution of age was not statistically significant. Age was also not significant in the model for *hours worked*.

Payment method was not significant in the model for *hours worked* or the model for *on call visits*. All independent variables were significant in the model for *visits per hour*, but combined to explain just 9.1% of the variation in that measure.

The standardized beta scores suggest that gender was the most important predictor of *total visits*, *on call visits*, and *hours worked*, but in no case was the strength of the relationship between gender and output substantial. Payment method was the most important predictor of *regular visits*, followed closely by gender, and was the most important predictor of *visits per hour*. Payment method was only slightly less important than gender in predicting *total visits*. The remaining independent variables – age and practice size – were relatively unimportant predictors in all output measures.

4.4.6 Reduced Models and Parsimony

After the initial regression models were produced containing all four independent variables, the models were reduced to eliminate the independent variables that did not significantly contribute to the explanation of variance in the output measure. This procedure was completed in two steps 1) eliminate insignificant independent variables; and 2) create models with the highest levels of parsimony possible.

Tests for parsimony were conducted to determine the 'best-fit' model for each of the five dependent output measures. The mathematical tests have been included as Appendix B. Table 4.9.2 presents the initial models, the models after removing insignificant contributors, and the 'best fit' models following the tests for parsimony:

Table 4.4.5b – Initial, Reduced, and Best Fit Output Models

Dependent Variable	Initial Model (All Factors)		Reduced Model (Only Significant)		Best Fit Model (Post-Parsimony)	
	Factors	R^2 (%)	Factors	R^2 (%)	Factors	R^2 (%)
Total Patients / Week	Gender Age Payment Prac. Size	16.3	Gender Payment Prac. Size	16.2	Gender Payment Prac. Size	16.2
Patients / Week – Regular	Gender Age Payment Prac. Size	19.4	Gender Payment Prac. Size	19.3	Payment Gender Prac. Size	19.3
Patients / Week – On Call	Gender Age Payment Prac. Size	2.4	Gender Age Prac. Size	2.5	Gender Prac. Size Age	2.5
Hours / Week	Gender Age Payment Prac. Size	11.1	Gender Prac. Size	11.1	Gender Prac. Size	11.3
Patients / Hour	Gender Age Payment Prac. Size	9.1	Gender Age Payment Prac. Size	9.1	Payment Gender Age	8.9

As depicted in the table, the removal of the insignificant contributors resulted in very little change to the percentage of variation explained by the independent variables. Tests for parsimony resulted in the elimination of just one independent variable (practice size) from one model (*visits per hour*). It is safe to conclude, then, that model reduction and tests for parsimony have provided the best fit models, as fewer input variables have resulted in little to no change in the percentage of variation explained. Appendix B contains a summary of all of the findings of the current study.

5.0 Discussion

This discussion will begin with an interpretation of the results with an eye to the prevailing views within the literature. The discussion will then shift to practical/policy implications of the findings with regard to the supply of physician services. Specifically, section 5.2 will address how the results might: improve policy making decisions; interact with the changing structure of the medical profession; and combine with evolving work habits to affect the supply of physician services. Finally the discussion will address the *research* implications of the study; changes that may have improved the study; areas of research that were not sufficiently addressed; and areas of research that have been opened up for further inquiry.

5.1 Interpretation of Results

To briefly review the study process, each hypothesis was presented in terms of the effect of an independent variable - gender, age, payment method, and/or practice size – on GP/FP output as measured by the following variables:

- total patient visits per week (*total visits*)
- patient visits per week during regular hours (*regular visits*)
- patient visits per week while on call (*on call visits*)
- hours worked per week (*hours worked*)
- patient visits per hour worked (*visits per hour*)

The null hypothesis (H_0) predicted no differences in the output measures would be found between groups, while the alternative hypotheses speculated there would in fact be differences. In the case of the analysis of variance procedures, a Scheffe post hoc analysis was used to identify specific differences between groups when the ANOVA deemed them to exist.

In some cases, the null hypothesis for the effect of an independent variable was rejected in a test against one or more output variable, but not all. In cases such as these, one cannot conclude that the independent variable had an impact upon the general concept of physician output. Rather, one must identify the specific measures of output that are affected by the independent variable in question.

Throughout the discussion of comparative procedures, male and female respondents are addressed separately. As presented in Section 3.0, the sample from which the data were drawn was stratified to ensure sufficient representation of female GP/FPs. This resulted in a sample which contained a disproportionate amount of female respondents, relative to the actual Canadian GP/FP population. As such, each of the comparative procedures requires separate treatment of male and female respondents. The specific effects of gender on output are dealt with in Section 5.1.1, when male and female output patterns are compared.

5.1.1 Gender – Interpretation of Results

In terms of the effect of gender on output of physician services, the analysis uncovered significant output differences between males and females in all output measures. The null hypotheses were rejected in all cases, as male GP/FPs reported statistically higher levels of output than their female counterparts in all output measures employed by this study.

The results of the comparative analyses are consistent with those reported in the literature. As presented in Section 2.0, Chan reported in 2003 that female physicians, in all age groups, across all specialties tend to work fewer hours per week than their male counterparts.[5] The 2005 College of Family Physicians of Canada JANUS report supported Chan's finding in addition to suggesting male GP/FPs tend to see a greater number of patients per week.[18] The findings of the present study with regard to patients per hour are also supported in the literature by Chan,[5] CIHI,[9] and the Canadian Medical Association.[10]

Potential reasons for the discrepancy in output between male and female physicians were submitted by Kilmartin et al, who suggested that key issues for women

in medical practice are job satisfaction; balance between personal and work life; and availability of flexible work and training – all issues that may cause female physicians to opt for workloads of lower intensity. In addition, they suggested while societal norms have evolved to accept females in the medical profession, women are still expected to fill the role of 'homemaker' in their personal lives.[26] This study provides additional support for the greater propensity of female GP/FPs to produce lower levels of output than male GP/FPs.

It should be noted, however, that within-group variability identified suggests that a significant array of output patterns exist even within the genders. There is no specific output pattern that all male physicians follow, and similarly no specific output pattern followed by their female counterparts. On the aggregate, however, the female physicians sampled reported lower output levels in all categories measured.

The *patients per hour* measure employed herein presents an important phenomenon that must not be ignored. Given that female respondents reported lower *patients per hour* levels, one might infer from this that they are spending more time with each patient that they do see. Indeed, Roter et al found that the average patient visit conducted by a female physician exceeded that of the average male colleague by two minutes.[36] In addition, the authors submitted, female physicians were more likely than their male colleagues to involve patients in their care decisions and address not only medical concerns, but emotional concerns as well. These activities may require additional time, and explain the lower levels of patient throughput reported by female physicians. While acknowledging the importance of consultation length and engagement to the patient experience, the focus of this study was to report and explain output of physician services. In addition, the current study made no attempt to measure the *most desirable* level of output, only to report and quantify existing levels.

5.1.2 Age – Interpretation of Results

The effects of age on output of GP/FP services were not as strong. The comparative analyses uncovered significant differences in output and rejected the null hypotheses in only three output measures. For example, output among female

respondents between 45 and 64 exceeded that of their older colleagues in three of the five output categories. No differences were found among males on the basis of age.

The trends regarding the effects of age on output approximated the prevailing view of the literature, but the actual statistically significant differences were less resounding. Reports published by Chan,[5] the Canadian Medical Association,[10] the College of Family Physicians of Canada,[18] and the American Academy of Family Physicians[15] all suggested that output was highest for physicians in the middle aged category (roughly between 40 and 60). While the raw mean scores identified in the current study seem to support these assertions, the differences were not deemed statistically significant. Substantial variability within groups may have contributed to the lack of statistical significance. In addition, the sample size may have been too small to warrant the division of physicians into five separate age groups.

5.1.3 Payment Method - Interpretation of Results

With respect to the effects of payment method on output of GP/FP services, several null hypotheses were rejected by the analysis. Specifically, responding female GP/FPs who received less than 20% of their income through fee-for-service payments reported significantly lower levels than their colleagues in three output categories: *total visits, regular visits,* and *visits per hour*. No differences were identified between the 20-80% group and the 'greater than' 80% group among females in any output measure.

The analysis identified more significant differences among male physicians. All three payment groups differed on the basis of *total visits, regular visits,* and *visits per hour*. Higher levels of fee for service remuneration appear to result in higher levels of output in these three output categories. An additional difference was identified in the hours worked output category, where male respondents receiving less than 20% of their remuneration through fee for service reported fewer hours worked than the 20-80% group. Curiously, the > 80% group did not differ significantly from either group on the basis of hours worked.

The comparative analyses conducted support the available literature on the effects of payment method on output of services. As Leitch and Walker,[28] Xu and Yu,[29] and Grignon et al[14] have suggested, output of services tends to be lower among

physicians receiving payment through fixed sources than for their colleagues who are remunerated through volume based schemes. A clear incentive seems to exist for the fee-for-service physician: the greater the throughput of patients, the greater the financial reward. This same incentive does not exist for physicians who receive little to no volume-based remuneration. The findings of the current study support this interpretation.

Although both male and female GP/FPs displayed different *patient per hour* levels on the basis of payment method, just one difference was found when *hours worked* was compared. While GP/FPs remunerated more substantially on a fee-for-service basis see more patients over a given period of time, perhaps those less dependent upon volume based schemes spend more time with each patient they attend to. Fixed remuneration methods have also been found to enable practitioners to spend more time teaching, researching, and maintaining their knowledge. A 1997 Government of Ontario report entitled *Alternate Payment Plans* submitted that salaried physicians spend 5.6 hours more on these activities than their fee-for-service counterparts.[37] Additionally, Leitch and Walker reported that fixed systems encourage attention to preventive medicine; are more conducive to a team building, integrated system; and allow for more effective planning of physician allocation.[28]

5.1.4 Practice Size – Interpretation of Results

With respect to the effects of practice size on output of GP/FP services, the results approximated those identified in the literature, but provided very few statistically significant findings. The relationships between output and practice size produced inverse relationships: as the number of physicians increases, output decreases. The most substantial difference was that between physicians practicing in solo arrangements and those plying their trade with at least one partner.

While the analysis produced many trends, the null hypotheses were only rejected in a small number of cases. The literature available on the effects of practice size on physician output is perhaps the most inconclusive of any output driver tested within this study. Reinhardt, in a 1975 study, concluded that physicians in single specialty group

settings actually saw *more* patients than their colleagues in solo practice.[19] The trends presented above seem to contradict Reinhardt's conclusions.

Other sources, such as the College of Family Physicians of Canada,[31] and James Hale,[30] have suggested that the move toward group practice, particularly among young physicians, has been driven by a desire for more flexible workloads. The implication is that group practice offers a greater balance between work and life, suggesting that group practice physicians might produce lower output levels than their solo practice colleagues. The findings of the current study seem to support this latter argument. Unfortunately, the lack of statistical significance in the differences presented renders these observations somewhat inconclusive.

While very few statistically significant differences were identified in the analysis, the trends suggested substantial differences in means between solo practice respondents and the rest of the sample within both genders. In light of this, a post hoc t-test was performed to compare output scores for solo practice physicians to those of all other physicians – the 2, 3, 4, and 5+ physician groups were combined into one 'group' category. The results of this post hoc analysis are included as Appendix D.

The post hoc analysis yielded clearer statistically significant differences when solo practice GP/FPs were compared to their group practice counterparts. Within both genders, solo practice respondents conducted more *total visits* and more *regular visits*. In addition, female solo practice respondents reported significantly greater *hours worked* than female group practice respondents. There were no differences between solo and group respondents on the basis of *on call visits* or *visits per hour* in either gender, and no difference in *hours worked* for males. The differences identified, however, would seem to support the suggestion that physicians choosing group practice for flexibility are seeing fewer patients than their solo practice colleagues.

5.1.5 Regression Procedures – Interpretation of Results

This study attempted to measure the effects of potential drivers on the output of GP/FP services, the latter of which was measured in a number of different ways, including: total patient visits per week; patient visits per week during regular hours;

patient visits per week during on call; hours worked per week; and patient visits per hour worked. The final analysis conducted quantified the combined contribution to variance in output of all four independent variables. In doing so, 'best fit' models were created for each of the five dependent output variables.

The regression analyses conducted between gender and the dependent output variables presented much the same result as the comparative analyses. For all output measures, gender was a significant contributor to the explanation of variance. Most notably, gender explained 10.2% of the variance in hours worked per week. This was the highest contribution of gender to any of the five dependent output measures.

While age was identified as a significant contributor to output in all measures aside from *visits per hour*, the actual contribution to each measure was small. Age explained just 2.3% of the variance in *hours worked*, which was the highest contribution made by age to any of the output measures.

The regression procedures determined payment method made significant contributions to explaining variance in 3 of the 5 dependent output categories. Payment method was not a significant contributor to *on call visits* or *hours worked*. The analysis identified R^2 values of 9.0%, 7.6%, and 6.6% for *regular visits*, *visits per hour*, and *total patients*.

Practice size was a statistically significant contributor to explaining the variance in all dependent variables. In terms of the magnitude of the contribution, the analyses uncovered very little. Only the *total patients* and *regular patients* measures produced R^2 values over 1% (1.9% and 3.5% respectively).

When all independent variables – gender, age, payment method, and practice size – were regressed, as a group, against the output measures they were able to explain a different proportion of the variance in each. In no case were the selected independent variables able to explain a substantial percentage of the variance. The highest R^2 values – those for *total visits* and *regular visits* – approach 20% with three factors included in the model.

It might be argued that the achievement of this level of explanation from just three factors is substantial. When one considers the overwhelming focus of the literature, however, on the independent variables employed, one might expect their

combined contribution to be greater. This lack of explanation from the key factors certainly begs the question: if gender, age, payment method, and practice size – the most frequently cited output drivers – explain less than one fifth of the variance in GP/FP output, what accounts for the remaining 80%?

This study also addressed the *strength* of the relationships between the four independent output drivers and the five dependent output measures. The results suggest that, relative to the other independent variables measured, gender and payment method were the most important predictors of output. It is important to note, however, that no reported standardized beta score indicated a strong relationship between any independent variable and any dependent output measure.

In addition to the prevalence of age, gender, payment method, and practice size, within the literature, there are also allusions to the less tangible concept of 'lifestyle preferences'.[8] These are defined as individual choices made by individual physicians, based on their life circumstances or general disposition toward work, with regard to what level of output they wish to provide.

The inherent nature of 'preference' makes it difficult to quantify. An individual physician who enjoys working long hours and seeing many patients may choose not to in light of some sort of personal circumstance. On the other hand, a physician with no similar personal circumstance may simply choose not to work as much because they prefer more free time. As such, to create a tangible measure for lifestyle preferences is challenging.

While the measurement of personal preference is inherently difficult, perhaps there are more tangible factors that contribute to GP/FP output that have not been identified, in the literature or by this study. The role of the present study has been to quantify the contribution of gender, age, payment method, and practice size to explaining the variance in GP/FP service output. Potential opportunities for additional research are discussed below when the focus of the discussion shifts to research implications.

5.1.6 Output Measures – Interpretation of Results

In terms of the five dependent variables and their appropriateness as measures of output, some conclusions can be drawn from the analysis conducted within the present study. Of the three 'volume' measures included – *total visits*, *regular visits*, and *on call visits* – the 'total' and 'regular' measures are by far the most responsive to the set of independent variables employed, garnering 16.2 and 19.3 per cent explanation of variance. There were also multiple differences identified by the one way analyses in these two output categories. The responsiveness seems to be more attributable to the *regular visits* measure, given that the *total visits* measure is a simple sum of the 'regular' measure and the 'on call' measure.

The inclusion of the *on call visits* measure seems to dilute the *total visits* measure. For all intents and purposes, there are very few differences in the number of patient visits physicians accept during their on call hours. The independent variables employed by the study were able to explain just 2.5% of the variance in *on call visits*, suggesting that the number of patients GP/FPs see while on call is not substantially dependent upon the factor variables employed. Perhaps the propensity to see patients while on call is influenced by other characteristics; alternatively, GP/FPs are homogenous in their inclination to see patients during this time.

While the *regular visits* measure is clearly the most responsive to the set of factor variables employed, the inclusion of *on call visits* was quite appropriate. The objective of the study was to determine the effects of several factor variables on output of physician services and, by extension, availability of those services to the population. Since some patients are tended to while a physician is on call, the exclusion of the on call portion of patient visits at the outset would have illegitimated a comprehensive representation of output.

The *hours per week* measure is unique in that it does not factor in the number of patient visits conducted by responding GP/FPs. The study's independent variables explained 11.3% of the variance in the number of hours respondents work per week. The inclusion of this output measure as well as the computed *visits per hour* 'efficiency' measure provide important information that cannot be obtained from the pure volume measures. These measures provide insight into how quickly the respondent is seeing

patients and perhaps how much non-patient related work the respondent is conducting, such as teaching and research, administration, and maintaining knowledge.

The dependent variables employed herein provide several measures of physician output activity. It must be noted, however, that the concept of 'output' is not necessarily synonymous with 'productivity'. While higher levels of 'productivity' are often desirable, it is important not to broadly suggest the same of higher *output* levels, especially if higher throughput of patients comes at the expense of physician service quality or attention to detail. In addition, time spent maintaining knowledge, teaching, and/or researching must not be considered unproductive.

As stated previously, this study has not sought to render a verdict on the *most desirable* level of output or to suggest that physicians should strive for the highest possible output of patient visits, hours worked, or patient visits per hour worked. The results presented serve only to only to identify and quantify the effects of various factors on output.

5.2 Policy Implications

As stated at the outset, the aggregate supply of GP/FP visits (V_A) over a given time period is the product of two elementary measures: 1) the total number (N) of GP/FPs and the structure of the GP/FP population, and 2) the number of patient ($\overline{V_i}$) visits that each of these GP/FPs accepts over this time period:

$$V_A = N \times \overline{V}_i \tag{5.1}$$

Both figures, naturally, are positively related to total supply: as one or both increase, *ceteris paribus*, total supply increases; as one or both decrease total supply responds in kind.

The structure of the GP/FP population (N) is influenced, as stated within this paper's conceptual framework, by public policy. Governments, in cooperation with Canada's medical schools, attempt to estimate the necessary supply of GP/FPs and adjust admissions to training programs accordingly. The second term, the average output of the individual GP/FP ($\overline{V_i}$), is influenced by several factors including gender, age, payment method, and practice size.

The objective of this study was to shed some light on this second phenomenon – *to what extent* do gender, age, payment method, and practice size influence the supply of GP/FP services? The previous discussion answered that question. The discussion now attempts to incorporate the results that correspond to that objective with the first determinant of supply: the size and structure of the GP/FP population. In short, how will this study's findings with respect to the drivers of output combine with the anticipated evolution of the GP/FP workforce to impact public policy decisions?

Generally speaking, the results presented immediately prior to this subsection suggest: 1) male GP/FPs see more patients and work longer hours than their female counterparts; 2) while physicians between the ages of 45 and 65 displayed the highest levels of output, age was perhaps not as influential as originally expected; 3) GP/FPs remunerated substantially on a fee-for-service basis see more patients than GP/FPs remunerated through other schemes; and 4) GP/FPs in solo practice see more patients than their colleagues who practice in groups of two or more. As presented in section 2.2, changes within the GP/FP population can be expected on all of these fronts.

5.2.1 Gender – Effects on Supply of GP/FP Services

With respect to gender, past trends in the objective data and the outlook going forward suggest overwhelmingly that the female proportion of the physician population will grow. The 32% of the *total* physician population currently occupied by females is expected to reach 40% by 2015.[8] Female physicians, relative to their male colleagues, display a greater propensity to opt for the general/family practice specialization.[10] While the gap appears to be narrowing,[12] one can safely assume that an increase to the female proportion of the overall physician population will lead to an equal or greater increase in the female contingent within the GP/FP ranks.

The findings of the present study with regard to the effects of gender on output of GP/FP services suggest that the increasing 'feminization' of the GP/FP workforce will result in significant ramifications for health human resource policy makers. If females are making up a greater percentage of the overall GP/FP workforce (as the

literature and objective data suggest) while displaying lower levels of output than their male counterparts (as this study has confirmed) one can expect average output to fall.

In light of this logic, the total GP/FP workforce would have to increase in order to avoid a decrease in *aggregate* output of patient visits. A study released by the Physician Resource Strategy for Canada suggests that the current physician to citizen ratio is expected only to *persist*, assuming that retirement, graduation, and net migration rates do the same.[8] This implies that, barring an unforeseen change in trend, we can expect an overall decrease, *ceteris paribus*, in the supply of patient visits to GP/FPs due to the changing gender structure of the physician population.

5.2.2 Age – Effects on Supply of GP/FP Services

The second factor addressed in this study was the effect of age on output of GP/FP services. While the analysis uncovered fairly little with regards to statistical significance, trends which approximated the available literature were quite apparent. As such, changes to the age structure of the GP/FP population may result in implications for physician human resource planning.

The average age of the Canadian physician population increased from 45.6 to 48.6 between 1993 and 2002.[7] In 2004, less than one quarter (24%) of the physician population was under the age of 40, down from 28% in 1999 – a four point decrease in just five years.[10] The contingent of physicians over the age of 50 experienced the opposite shift, as its proportion of the total workforce rose from 39% in 1999 to 44% in 2004.[10] The available data also suggests that GP/FPs tend to be younger than their specialist counterparts, as the latter undergo lengthier educational and training requirements. The age of the average specialist rose by just one per cent between 1993 and 2002, while the GP/FP average increased from 43.3 to 46.6.[11] These figures suggest that recent increases to the average age of the overall physician workforce have occurred predominately within the GP/FP subpopulation.

According to the Canadian Medical Association,[38] 34% of GP/FPs were under 45 years of age in 2006. The same data suggests that the 45 – 65 contingent made up 55% of the total GP/FP workforce. These numbers are moderately alarming. In 20 years, the < 45 group will relieve the 45 – 65 group, but the former will have insufficient

numbers to fully replace the latter group on a one for one basis. Recalling the conceptual model – $V_A = N \times \overline{V}_i$ – the total supply of GP/FPs (N) can be expected to fall. Without an equal and opposite increase in average patient visits ($\overline{V_i}$), one would expect output within the 45 – 65 group to fall as a result of the changing age structure. Given the significant percentage of aggregate supply of patient visits (V_A) attributable to the 45 – 65 group, one would anticipate a serious reduction in the availability of GP/FP visits.

In addition, the literature suggests – and trends presented within the current study support the claim – that younger physicians produce lower levels of output than the 45 to 65 contingent. What is not clear, however, are the reasons for the discrepancies in output. Specifically, are differences a result of age and life stage or are they a result of generational preferences? In other words – will the current contingent of < 45 year old physicians adopt the work habits of the current contingent of 45 – 65 year olds when the former reach the latter's current state, or will younger physicians carry their present behaviour forward?

The importance of such a question is clear. If today's average young physician adopts the output level of today's average middle-aged physician when the former enters her middle years, one can expect average output of patient visits ($\overline{V_i}$) to remain constant. As such, *aggregate* output (V_A) will fall only in proportion to the nominal decrease in the workforce (N). On the other hand, if today's young physician carries her current work habits forward into her middle years, one can expect the reduction in aggregate output (V_A) to be compounded further by a reduction in *average output* ($\overline{V_i}$).

While changing behavioral patterns are difficult to anticipate, there are reasons to believe that the second scenario is more likely than the first. American author Lois Margaret Nora, in a paper presented to the International Medical Workforce Congress, divides physicians into four categories on the basis of age:[39] the Silent Generation (1925 – 1942); the Boomers (born 1943-1960); the GenXers (1961-1981); and the Millennial Generation (1982-2001). While Nora is an American author depicting the American physician population, her points are salient to the Canadian physician workforce.

Nora submits that the Boomers, due partially to their upbringing during economically prosperous times within two-parent stable households, "are known for their intense work ethic…value teams and have a 'can do' spirit." She suggests, in addition, that to Boomers "paying one's dues is an expected part of life, and rewards are often justified on the basis of seniority." Nora's assessment, based on the dates provided, would define as Boomers all responding GP/FPs between the ages of 44 and 62. Physicians over the age of 62, based on the same assessment, are part of the Silent Generation.

The youngest physicians in the study sample – those below the age of 44 – fall within the Generation X group. Nora's paper also provides an assessment of the GenXers. Brought up during difficult times, often in unstable and stressful familial environments, GenXers, suggests Nora, demonstrate "a strong commitment to balance and integration between their personal and professional lives." She submits as well that GenXers are hard workers and display superior technological skills to those of their older colleagues.

With regard to their work habits, Nora argues that the focus of this generation is on "completing a job well and does not necessarily incorporate long hours, enthusiasm for extra work without compensation, or intense loyalty to the organization." In addition, GenXers value interesting work, flexible environments, continual feedback, and opportunities for personal and professional growth. Finally, "whereas Boomers reward seniority," Nora concludes, "Generation Xers reward and respect competence." Nora's research suggests that differences in output between GP/FPs within different age groups are more than just a function of physician life stage.

In 2004, the American research organization Merrit, Hawkins & Associates conducted a survey of physicians between 50 and 65 years of age.[40] Among other questions, the survey asked responding physicians to rate the work ethic of younger physicians compared to that of their own generation. Of the 436 physicians who responded to the survey, not a single one indicated that today's young physicians are harder working than their own generation. Just 29% of respondents placed their work ethic on equal footing with the younger generation, and 64% indicated that physicians coming out of training today are less dedicated and hard working than themselves.

The authors of the study suggested that the response "underscores the profound gap in perspectives and backgrounds that may exist between more senior physicians and those new to medicine." They go on to submit that more recently trained physicians place more emphasis on quality-of-life issues than senior physicians and expect set hours and regular vacation time. The authors conclude that this attitudinal disconnect is one reason that an absence of the most senior physicians could significantly impact the supply of physician services.

We now return to the conceptual model presented above: $V_A = N \times \overline{V}_i$. As discussed, the changing structure of the GP/FP population (*N)* going forward can be expected drive aggregate output (V_A) down. The conclusions of Merritt Hawkins and those of Lois Margaret Nora provide insight into the future state of average individual physician output ($\overline{V_i}$). Specifically, based on the generational differences in attitudes toward work, we can expect that the work habits, and therefore the average individual output ($\overline{V_i}$) of today's younger GP/FPs will be carried forward as they become tomorrow's senior GP/FPs. This will place downward pressure on $\overline{V_i}$ and therefore downward pressure on V_A in addition to that created by the changing structure of the GP/FP population (*N)*.

5.2.3 Payment Method – Effects on Supply of GP/FP Services

The third factor variable measured against output was respondent payment method. The analysis confirmed the prevailing view of the literature – GP/FPs who are remunerated on a volume (or fee-for-service) basis display higher levels of output than physicians who are remunerated through salaried and blended payment methods. It is likely, therefore, that the evolving payment structure of the aggregate GP/FP population will result in changes to the aggregate supply of GP/FP services.

While fee-for-service has been (and still is) the dominant form of physician remuneration in Canada, the tide appears to be shifting toward alternative methods. According to the Canadian Medical Association, in 1990, 67.5 per cent of all Canadian physicians were remunerated through fee-for-service payments. During the same year, 9.2% reported salary was their main method of payment, while 20.8% cited some form

of blended payment method. Thirteen years later, in 2003, the fee-for-service and salaried proportions had fallen to 56.9 and 7.6 per cent respectively, while blended payment methods had risen drastically to 32%.

While the number of physicians receiving salaried remuneration did not substantially change over this period, preference for the method increased from 18.3% in 1995 to 27.1% in 2003, suggests the CMA.[10] Over the same time period, preference for fee-for-service remuneration dropped from 50.4% to 36.5% as did preference for blended methods, from 25.0% to 21.1%. Perhaps the availability of alternatives to fee-for-service has not yet met these changing physician preferences and has resulted in the discrepancy between *preferred* payment method and *actual* method of remuneration.

In any case, it appears as though physician preferences have begun to shift from volume based remuneration schemes to those that offer income stability and lifestyle flexibility. This rationalization reconciles with the logic presented by Nora with regard to generational disparities. As Generation X and Millennial physicians begin to account for a greater percentage of the physician population, bringing with them a desire for lifestyle balance, the popularity of fixed payment methods can be expected to ascend even further.

Returning, then, to the conceptual model previously discussed ($V_A = N \times \overline{V}_i$), the literature has suggested, and the current study has confirmed, that the average individual output ($\overline{V_i}$) of salaried physicians and physicians receiving their remuneration through blended payment methods is lower than that of physicians paid mainly through fee-for-service. The literature and objective data also suggest that blended payment methods have become more prevalent, and salary is becoming more popular amongst the physician population. This suggests, in the future, the total GP/FP population (*N*) will be more substantially remunerated through methods other than FFS. The increasing prevalence of these payment methods – which seem to result in lower levels of service output – can be expected to drive down the aggregate supply of physician services (V_A).

5.2.4 Practice Size – Effects on Output of GP/FP Services

The final output driver tested was GP/FP practice size – the number of physicians working in the same practice setting as the responding GP/FP. The prevailing view within the literature, though somewhat contested therein, was confirmed by the analysis: with the exception of time on call, GP/FPs in solo practice see more patients and work longer hours than GP/FPs who share their practice with other physicians. If the group-solo practice mixture evolves on an aggregate level, there are potential implications for policy makers.

As presented in this study's review of the literature, GP/FPs appear to be moving toward group practice. The Physician Human Resource Strategy for Canada submitted that 64% of GP/FPs were active in group practice in 1998.[8] They suggest, in addition, this number is expected to increase as the physician population evolves. This prediction seems to reconcile with one of the over-arching views of the literature: younger physicians, as they move into the workforce, are placing greater emphasis on balanced lifestyles and flexibility in their schedules. Group practice appears to offer greater flexibility; if a physician needs time off, there is at least one other physician to take over the patient load. Set hours and set vacations are more easily accomplished under a group arrangement than a solo arrangement.

Recalling the conceptual model once more ($V_A = N \times \overline{V}_i$), the aggregate supply of physician services (V_A) is a product of the physician population (N) and the individual output of the average GP/FP ($\overline{V_i}$). The literature and the present study indicate that differences in the individual output of the average GP/FP ($\overline{V_i}$) exist, depending on whether the GP/FP is in solo or group practice. Specifically, group practice physicians display lower levels of output than their solo practice counterparts. As the structure of the GP/FP population (N) evolves and the prevalence of group practice physicians continues to increase relative to solo practice physicians, we can expect aggregate supply of physician services (V_A) to fall, *ceteris paribus*.

5.2.5 Collective Effects of Gender, Age, Payment Method and Practice Size

The previous four segments have presented the expected individual effects that gender, age, payment method, and practice size will have on the supply of GP/FP services in Canada. As the structure of the GP/FP population evolves, with respect to these four variables, the output of the aggregate GP/FP workforce will change. Specifically, the impending increase in the percentage of female GP/FPs, expected increase in GP/FP retirements, anticipated shift away from the fee-for-service payment method, and projected decrease in the number of solo practicing GP/FPs will all individually exert downward pressure on aggregate output as the groups of GP/FPs displaying lower levels of output increase in size, relative to the total workforce. If the current combination of output patterns and population trends persists, one would expect the future availability of GP/FP services to fall.

On the other hand, the objective of this study was to identify the percentage of all that influences GP/FP output that is attributable to gender, age, payment method, and practice size. These four variables – the most often cited as influencing output – explained no more than one fifth of the variance in any of the output measures used. Simply put, projections employing only GP/FP age, gender, payment method, and practice size, *even when combined with associated trends in the physician population*, are not sufficient to accurately pinpoint the future supply of GP/FP services. Either there are additional unidentified factors that hold significant sway over the output patterns of physicians, or else these output patterns are simply so variable that they are unexplainable to any greater degree.

5.2.6 External Influences on the Availability of GP/FP Services

The previous discussion, by and large, has focused on the effects of each independent variable under the assumption of *ceteris paribus* – without the consideration of outside factors. This subsection will attempt to incorporate some externalities into the discussion, relaxing that assumption. Specifically, what measures are being taken by governments and other organizations to combat these potential problems?

Canadian health human resource policy makers are well aware of impending problems regarding access to primary care. The focus of research and recommendation in this area has been on the absolute supply of physicians, as opposed to the work habits and output patterns of the physician population. In 1999, the Canadian Health Forum Task Force on Physician Supply recommended increases to medical school enrolment positions. Specifically, the report recommended that enrolment be increased from 1577 to 2000 positions by the year 2000. In addition, it was suggested that efforts should be increased to "retain and repatriate" Canadian physicians; increase provincially funded residency positions; develop a formal process for reviewing enrolment on a regular basis; and address issues regarding distribution and new care delivery models.[41]

A 2005 Physician Workforce paper published by the Canadian Medical Association praised the response of governments to the recommendations. By 2004/05, medical school enrolments had increased by almost 40% to 2193. The same CMA paper cautions, however, that these initiatives will not be sufficient to solve access problems and submits that national self-sufficiency would require that enrolments increase to at least 2500 new entrants per year. The CMA, while condemning the systematic recruitment of international medical graduates, proposed an international on-line program that would allow international graduates to determine their suitability to completing post-MD training programs and entering Canadian practice. In addition, the same publication urged rapid expansion of the post-MD training system as it is currently insufficient to accommodate the existing crop of eligible International Medical Graduates in Canada.[42]

As presented in the literature review, another contentious issue with significant potential impact on the availability of primary care services is that of primary care reform. Policy analysts continue to look at new ways of providing primary care services, and while the concept of reform is supported by most, the appropriate model is greatly debated. As stated at the outset, the primary care debate is comprised of two schools of thought: the professional model and the community model. The former seeks an integrated approach to health care that would allow the physician to continue to hold primary responsibility over the provision of health services and to remain the gatekeeper to the rest of the health system. The community model would seek broader reform,

placing overall well-being ahead of health service provision and reduce physicians to just one aspect of health care.[25]

Depending on which school of thought forms the basis for primary care reform, the result will be significant for primary care access. If physicians are no longer the gatekeepers to the remainder of the health system, their output levels and the characteristics which influence them may be less integral to accessing primary care services. In this case, perhaps the initial point of contact will shift from the physician to a nurse, nurse practitioner, or some other health professional, increasing the importance of these individuals with regard to access. On the other hand, if physicians remain the sole gatekeeper with primary care responsibility, the potential problems upon which this study focused will remain as such, barring increases to average output levels, changes in physician population structural trends, or increases to the absolute number of physicians.

The original contribution to the existing body of literature – the quantification of the effects of the major output drivers – will improve decision making ability as it regards the supply of primary care services. In addition, it is important that policy makers recognize the difference in output levels *within* the physician population; the current focus respecting primary care access seems to be on the absolute supply of physicians, as opposed to the individual physician's penchant to conduct patient visits. The number of physicians, while important, is only half of the equation. Equally vital are the characteristics that influence output and their constantly changing prevalence within the physician workforce.

5.3 Research Implications

5.3.1 Areas for Improvement

The objective of this study was to test and quantify the effects of gender, age, payment method, and practice size on output of GP/FPs in Canada as measured by patient visits conducted, hours worked, and patient visits conducted *per* hour worked. The literature contained ample evidence that these four factor variables – gender, age, payment method, and practice size – held sway over physician output. The present study sought to confirm or reject the prevailing view of the literature through an analysis

of data collected in the course of a survey of Canadian general and family practitioners. Going further, the intent was to provide an original contribution by determining the *extent to which* these variables contributed to the overall variance in GP/FP output.

The methodology employed was sufficient to meet the stated objectives. The trends in the study data matched those reported within the literature, and statistically significant findings confirmed many of the latter's prevailing views. Regression analysis provided a method through which the contribution of the contingent of independent variables could be quantified; this was accomplished and reported within the study's results. In hindsight, however, the study methodology was not void of all limitation.

One limitation frequently cited within studies employing survey data is the size of the sample population. The present study was no exception, as the data produced trends in many cases that could not be deemed statistically significant. Sample stratification for gender made it necessary to analyze male and female physicians separately, effectively dividing the sample in half for many of the statistical procedures. While natural variability within the GP/FP sample can be blamed to some extent tests for statistical power of the comparisons were conducted and included in the tables presented in Section 4. The associated methodology and calculations are included as Appendix E. The results of these statistical power tests suggest that while some additional differences may have been identified if the sample were larger, the relationship between the effect sizes and statistical power indicate that for the most part the sample employed was sufficient.

In addition to constraints resulting from the sample size, the study may have suffered mildly due to the lack of measurement of a particular output driver identified within the literature. Though not cited as often as the four measures tested, some sources suggested that a physician's country of origin – more specifically the country from which he or she received their medical degree – may influence output. The pool of data from which this study has drawn did not include a measurement of this characteristic. Though data suggests that the pool of international medical graduates contains proportionally more male physicians and physicians who are older than the

domestic contingent – two characteristics which also influence output – the inclusion of this measure may have improved the study's comprehensiveness.

5.3.2 Contributions to Research

The original contribution of the present study is the quantification of the effects of gender, age, payment method, and practice size on GP/FP output of services. The virtue of this contribution is in its implications for further research in this area. Previously it was quite clear that these four variables held some sway over the number of patient visits conducted by GP/FPs and their hours worked; even the *type or direction* of the relationships were identified with significant unanimity. Prior to this study, however, the effects of gender, age, payment method, and practice size *as a proportion of all that influences physician output* had not been quantified.

The total contribution of the four variables in question to the output measures employed reached 19.4% at its highest level. In other words, gender, age, payment method, and practice size account for 19.4% of all of the possible variables that influence GP/FP output. The implication of this finding for other researchers is clear: what accounts for the remaining 80+%? In addition, what is the nature of the additional factors: are they demographic, practice or physical characteristics and thus easily measured, or are they based on preferences and therefore less tangible?

If the unknown sources of the remaining variance can be ascertained, this will enable researchers to make better predictions regarding the future supply of physicians. As it stands, one cannot project current output levels by physician group, simply because the variance in output levels is too high. Either physicians are simply too variable in their output behaviour, or there are some as yet unidentified factors influencing the workloads they choose to take on. The current study has quantified the contribution of gender, age, payment method, and practice size, the four most often cited determinants of GP/FP output. Now that this information is available, researchers in this area are better equipped to address the remaining factors in order to improve our understanding of physician output behaviour.

6.0 Conclusion

The analysis conducted above has provided support to the prevailing views held within the literature with respect to the effects of gender, age, payment method, and practice size on physician output of primary care services. All four of these variables seem to impact the workloads of Canadian general and family practitioners, though some to greater extents than others. These results confirm some impending problems with regard to the future availability of primary care services. Specifically, the groups within the physician population which seem to display the lowest levels of output – the oldest and youngest physicians, female physicians, physicians remunerated through alternative payment methods, and physicians in group practice – are becoming larger in proportion to the GP/FP population as a whole. This trend will create downward pressure on the aggregate supply of primary care services and make it more difficult for citizens to access these services.

Governments are aware of these potential difficulties, but policy makers seem to be addressing only part of the problem – the absolute number of physicians. As vital are physician output patterns, as evidenced by the results presented above. The supply of primary care services may fall as a result of the changing structure of the physician population, *even if* physician to citizen ratios persist. For these reasons, this line of inquiry is vitally important and should be incorporated into physician supply discussions.

This study has made an original contribution to the health human resources literature. Prior to this endeavour, an attempt to quantify the effects of gender, age, payment method, and practice size on general and family practitioner output of services had not been made. This work, in addition to filling a pre-existing void in the literature, provides a starting point from which researchers in this area can expand the output model. It is the author's hope that further research can determine the additional factors

that influence GP/FP workloads and provide a more comprehensive list of output drivers.

Appendix A – Data Source

Emerging Issues in the Work of Physicians

2004

Emerging Issues in the Work of Physicians

The objectives of this survey are to seek the views of physicians across Canada regarding: 1) quality of health care; 2) roles of physicians in their communities; 3) professional equity and stress; 4) organization of medical practices; 5) career satisfaction; and 6) demographic factors.

1. The state of the health care system <u>in your community</u>.

The QUALITY of the health care system in your community is:

Very Poor	Poor	Adequate	Good	Very Good	Excellent
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

The EFFICIENCY of the health care system in your community is:

Very Poor	Poor	Adequate	Good	Very Good	Excellent
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

ACCESS to the health care system in your community is:

Very Poor	Poor	Adequate	Good	Very Good	Excellent
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Please indicate your assessment of ACCESS to specific services in your community, *using the following scales (circle the appropriate response 0 = worst; 100 = best):*

Community-based services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Mental Health services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Hospital services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Rehabilitation services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Nursing Home services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)

COORDINATION between the different health care services in your community is:

Very Poor	Poor	Adequate	Good	Very Good	Excellent
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

COLLABORATION among the different health professionals in your community is:

Very Poor	Poor	Adequate	Good	Very Good	Excellent
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Please indicate your assessment of QUALITY of specific services in your community, *using the following scales (circle the appropriate response 0 = worst; 100 = best):*

Community-based services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Mental Health services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Hospital services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Rehabilitation services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)
Nursing Home services	(Not Applicable	0	10	20	30	40	50	60	70	80	90	100)

Which of the following health policies do you think is best for Canada? *(Please rank the policies using 1 to indicate the best; 2 for the 2nd best; and so on, to 5 for the worst health policy):*

[ ] A national health service with government owned health facilities, salaried physicians and staff
[ ] A single universal and comprehensive insurance plan with no user fees or extra billing
[ ] Universal & comprehensive insurance combined with extra charges for people not on social assistance
[ ] Competing public & private insurance plans with an adequate level of benefits in the least costly plan
[ ] Government plans limited to covering expenses which would cause financial hardship for the patient

2. Role in the Community: Physicians are typically active in a variety of roles in the community. Please indicate the roles that you are active in.

What is your involvement in:	Please check ALL that apply					
	Attend or participate	Volunteer	Provide medical expertise	Coach or Instruct	Fund-raiser	Leadership role
Sporting & Recreational Activities?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Cultural Activities/ Art / Music / Drama?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Religious Activities?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Charities/Community Service Activities?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Health Care Organizations?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Other Professional Organizations?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

About how much time do you spend on all your community activities in an average week?

Not Applicable [ ] | Up to 4 hours [ ] | 5 – 8 hours [ ] | 9 – 12 hours [ ] | 13 – 16 hours [ ] | 17 – 20 hours [ ] | 20 + hours [ ]

Does participation in your community activities relieve the pressures of your job?

Not Applicable [ ] | Always [ ] | Most of the time [ ] | Sometimes [ ] | Rarely [ ] | Never [ ]

Please indicate whether you wish to increase or decrease your commitments. It is possible to indicate a desire to become active in areas that you are not currently active in, *using increase or greatly increase*.

What changes would you like to make in your involvement in:	Greatly reduce	Reduce	No change	Increase	Greatly increase
Sporting & Recreational Activities?	[ ]	[ ]	[ ]	[ ]	[ ]
Cultural Activities/ Art / Music / Drama?	[ ]	[ ]	[ ]	[ ]	[ ]
Religious Activities?	[ ]	[ ]	[ ]	[ ]	[ ]
Charities / Community Service Activities?	[ ]	[ ]	[ ]	[ ]	[ ]
Health Care Organizations?	[ ]	[ ]	[ ]	[ ]	[ ]
Other Professional Organizations?	[ ]	[ ]	[ ]	[ ]	[ ]

Would you like to change the level of your leadership in community activities?

Greatly Decrease Leadership activities [ ] | Decrease Leadership activities [ ] | No change [ ] | Increase Leadership activities [ ] | Greatly Increase Leadership activities [ ] | *Not applicable* [ ]

3. PROFESSIONAL EQUITY

Professional equity is defined as the balance between the contributions of physicians and the rewards they receive. Each physician fulfills obligations: to society; to patients; and to their profession, in their own unique way as an independent practitioner. Your responses to the following statements will allow you to assess the contributions you make, the rewards you receive, and whether equity has been achieved or not achieved.

Contributions in maintaining your practice

Nature of contribution	*not applicable*	Very Low	Low	Moderately Low	Moderately High	High	Very High
The physical effort you make to keep up with your various duties as a physician is:							
The intellectual effort you make in maintaining your clinical knowledge is:							
The mental effort you make to be empathetic in the care of your patients is:							
The effort you make to complete paperwork, return phone calls and other administrative duties is:							
The investment you make for clinical equipment to maintain your practice is:							
The investment you make in qualified staff to maintain your practice is:							

Your sense of personal gratification derived from providing care to patients is:

Very Low [ ] Low [ ] Moderately Low [ ] Moderately High [ ] High [ ] Very High [ ]

Your sense of contributing to society in your various roles as a physician is:

Very Low [ ] Low [ ] Moderately Low [ ] Moderately High [ ] High [ ] Very High [ ]

The proportion of uninteresting work in your daily activities is:

Very Low [ ] Low [ ] Moderately Low [ ] Moderately High [ ] High [ ] Very High [ ]

The opportunities to use your most advanced clinical skills are:

Very Low [ ] Low [ ] Moderately Low [ ] Moderately High [ ] High [ ] Very High [ ]

The amount of choice you have over the activities you carry out or participate in is:

Very Low [ ] Low [ ] Moderately Low [ ] Moderately High [ ] High [ ] Very High [ ]

The level of your contributions to the general well-being of your community is:

Very Low [ ] Low [ ] Moderately Low [ ] Moderately High [ ] High [ ] Very High [ ]

Your sense of accomplishment from your work as a physician is:

Very Low [ ] Low [ ] Moderately Low [ ] Moderately High [ ] High [ ] Very High [ ]

At the present time, your *sense of fulfillment* for the contributions you make is:

Very Low [ ] Low [ ] Moderately low [ ] Adequate [ ] Moderately High [ ] High [ ] Very High [ ]

Financial Rewards

How well does your income reflect:	Not at all	Slightly	Partially	Moderately	Mostly	Perfectly
The time you spend on your duties?						
Your qualifications and training?						
Your responsibilities?						
The stresses of making risky decisions?						
Your years of experience?						

Your practice expenses are adequately reflected in your income.

Strongly disagree [ ] Disagree [ ] Disagree slightly [ ] Agree slightly [ ] Agree [ ] Strongly agree [ ]

The process used to determine rates of reimbursement in your province/territory is fair to you.

Strongly disagree [ ] Disagree [ ] Disagree slightly [ ] Agree slightly [ ] Agree [ ] Strongly agree [ ]

At the present time, the *financial compensation* you receive for the contributions you make is:

Very stingy [ ] Stingy [ ] Somewhat stingy [ ] Acceptable [ ] Somewhat generous [ ] Generous [ ] Very Generous [ ]

Your patients often express appreciation for the clinical care that you provide to them.

Strongly disagree [ ] Disagree [ ] Disagree slightly [ ] Agree slightly [ ] Agree [ ] Strongly agree [ ]

Your contributions to the general well-being of your community are recognized.

Strongly disagree [ ] Disagree [ ] Disagree slightly [ ] Agree slightly [ ] Agree [ ] Strongly agree [ ]

When you make an extra effort you receive recognition from your peers.

Strongly disagree [ ] Disagree [ ] Disagree slightly [ ] Agree slightly [ ] Agree [ ] Strongly agree [ ]

Nurses you work with show respect for you as a physician.

Strongly disagree [ ] Disagree [ ] Disagree slightly [ ] Agree slightly [ ] Agree [ ] Strongly agree [ ]

Administrators you work with understand the stresses you experience as a physician.

Strongly disagree [ ] Disagree [ ] Disagree slightly [ ] Agree slightly [ ] Agree [ ] Strongly agree [ ]

At the present time, the *recognition* you receive for the contributions you make is:

Very Disappointing [ ] Disappointing [ ] Somewhat Disappointing [ ] Reassuring [ ] Somewhat Gratifying [ ] Gratifying [ ] Very Gratifying [ ]

Overall, the full range of rewards you receive for all the contributions you make are:

Very Unfavourable [ ] Unfavourable [ ] Somewhat Unfavourable [ ] Fair [ ] Somewhat Favourable [ ] Favourable [ ] Very Favourable [ ]

4. Regular Working Hours per Week (excluding On Call)

Please indicate whether you would like to spend *more* or *less time* devoted to specific activities. Also, you may wish to spend time on activities that you are not currently doing (eg. teaching or research); this can be indicated by checking *'more'* or *'much more'*.

Direct Patient Care	Much less	Less	No change	More	Much more
Assessment & treatment by you alone	[ ]	[ ]	[ ]	[ ]	[ ]
Assessment & treatment in a group with you in charge	[ ]	[ ]	[ ]	[ ]	[ ]
Assessment & treatment in a group with someone else in charge	[ ]	[ ]	[ ]	[ ]	[ ]
Advising patients about their conditions	[ ]	[ ]	[ ]	[ ]	[ ]
Indirect Patient Care	Much less	Less	No change	More	Much more
Communicating care plans to other health professionals	[ ]	[ ]	[ ]	[ ]	[ ]
Charting, telephone calls & other patient related duties	[ ]	[ ]	[ ]	[ ]	[ ]
Teaching and Research	Much less	Less	No change	More	Much more
Supervising students and residents	[ ]	[ ]	[ ]	[ ]	[ ]
Lecturing and demonstrating clinical techniques	[ ]	[ ]	[ ]	[ ]	[ ]
Participating in research projects	[ ]	[ ]	[ ]	[ ]	[ ]
Maintaining Knowledge	Much less	Less	No change	More	Much more
Participating in patient care conferences/rounds	[ ]	[ ]	[ ]	[ ]	[ ]
Attending meetings/conferences related to quality	[ ]	[ ]	[ ]	[ ]	[ ]
Obtaining CME credits and/or keeping up with medical literature	[ ]	[ ]	[ ]	[ ]	[ ]
Administrative Duties	Much less	Less	No change	More	Much more
Administrative tasks associated with your practice	[ ]	[ ]	[ ]	[ ]	[ ]
Time developing or evaluating clinical programs	[ ]	[ ]	[ ]	[ ]	[ ]
Other service, organizational, or administrative duties	[ ]	[ ]	[ ]	[ ]	[ ]

Please indicate the approximate percentage of time you now spend on these activities.	Direct Patient Care	%
	Indirect Patient Care	%
	Teaching and Research	%
	Maintaining Knowledge	%
	Administrative Duties	%
		100 %

Approximately how many hours do you work per week (excluding on call)? [ ]

5. On-Call & Call Backs

	None	1-2 per month	3-4 per month	5-6 per month	7-8/ month	9-12/ month	13-17/ month	18+ / month
How many WEEKDAY evenings (Mon-Fri) are you On-Call in an average month?	☐	☐	☐	☐	☐	☐	☐	☐

	None	one	two	3 or 4	5 or 6	7 or 8
How many SATURDAYS OR SUNDAYS in an average month are you On-Call?	☐	☐	☐	☐	☐	☐

Of the evenings you are On-Call what % do you **not get called at all?** _____ %

Of the evenings you are On-Call what % do you **handle by phone?** _____ %

Of the evenings you are On-Call what % do you **Attend in person?** _____ %

6. Stress and support in your work

How frequently do you:	Never	A few times a year	Once a month	2 –3 times a month	Once a week	2 – 3 times a week	Every day
Feel really good because a patient has recovered from a serious illness?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Have workdays when you can devote enough time to all of your patients?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Experience frustration dealing with demanding patients?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Get relief from another physician?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Have workdays which are so busy that you are physically exhausted at the end of the day?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Have a break that relieves the pressures of your workday?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Feel frustrated accessing facilities/services for patients?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Sleep soundly at night without worrying about your job responsibilities?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Feel that your work has desensitized your feelings/ emotions?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Feel depressed because of the death or serious illness of a patient?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Have such demanding workdays that you are emotionally drained at the end of the day?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Feel excited about the work that you do?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Experience conflict between responsibilities at work and at home?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Feel that you are in control of your day-to-day working activities?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

How would you rate your level of stress?	Very low ❑	Low ❑	Moderate ❑	High ❑	Very High ❑
How would you rate your level of health?	Very poor ❑	Poor ❑	Fair ❑	Good ❑	Very Good ❑

7. Please indicate how you manage stress in your work

How frequently do you:	Never	A few times a year	Once a month	2–3 times a month	Once a week	2 – 3 times a week	Every day
Take time to review the tasks of your day and plan accordingly?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Set aside some time for specific activities of professional interest?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Maintain an optimistic attitude, throughout the workday?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Discuss issues and problems with staff?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Express impatience when people do not respond to requests as quickly as they should have?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Pause for a relaxing break during the workday?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Eat a nutritious lunch sometime during the workday?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Take time to pursue professional activities of special interest?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Engage in physical exercise?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Cancel a personal or social activity in order to meet work commitments?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Express anger when people at work make mistakes?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Approach *difficult tasks* as opportunities to learn and develop skills?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Spend time keeping up or advancing your clinical knowledge or skills?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

When you need to talk about a problem there are colleagues available who can give you sound advice.

Strongly Disagree	Disagree	Disagree slightly	Agree slightly	Agree	Strongly Agree
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

A colleague is willing to take on extra work so that you can take time for special training or CME.

Strongly Disagree	Disagree	Disagree slightly	Agree slightly	Agree	Strongly Agree
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

If you needed a week off to attend to special needs a colleague would fill in for you.

Strongly Disagree	Disagree	Disagree slightly	Agree slightly	Agree	Strongly Agree
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

How would you rate your ability to cope with stress?	Very poor	Poor	Fair	Good	Very Good
	❑	❑	❑	❑	❑

8. Please describe your practice arrangements

Indicate the location of your office(s), *using 1 for main & 2 for a secondary office*

- ☐ Home-based practice
- ☐ Converted residence
- ☐ Office Building/Tower
- ☐ Shopping Centre/Strip Mall
- ☐ Hospital Office
- ☐ Rehabilitation Centre
- ☐ Nursing Home
- ☐ Health Centre/Community Clinic
- ☐ Government office or Other_____

How many physicians are in your main practice setting?_____

How many years have you been practicing medicine? ☐

Main Setting *Check more than one, if applicable)*	**Secondary Setting** *Check more than one, if applicable)*
☐ Solo Practice	☐ Solo Practice
☐ Physician Group	☐ Physician Group
☐ University Group	☐ University Group
☐ Hospital-based	☐ Hospital-based
☐ Local Community Group	☐ Local Community Group
☐ Health Region/District	☐ Health Region/District
☐ Other_____	☐ Other_____
Main Arrangement	**Secondary Arrangement**
☐ Solo Practice	☐ Solo Practice
☐ Individual revenues & expenses	☐ Individual revenues & expenses
☐ Share expenses	☐ Share expenses
☐ Share revenues & expenses	☐ Share revenues & expenses
☐ On contract	☐ On contract
☐ Salaried	☐ Salaried
☐ Locum	☐ Locum
☐ Other_____	☐ Other_____

How many patients do you see in an average week?

Regular Hours ☐

On Call ☐

Of ALL the patients you see in an average week, approximately what percent have:

ROUTINE conditions, given your specialty	%
COMPLEX conditions, given your specialty	%
SERIOUS personal/family problems (drug abuse, battering etc)	%
BOTH complex medical conditions & serious personal/family problems	%
	100 %

What percentage of your remuneration comes from the following methods?

Fee-for-service	%
Salary	%
Capitated rate per patient	%
Sessional	%
Other_____	%
	100 %

9. Managing your practice

Please indicate how each of the following functions are handled in your practice.

Does your main practice:	*Not applicable in my practice*	Not done	Yes, informally	Yes, using a formal process	Yes, in a hospital, chronic care, or regional facility
Conduct meetings to discuss administrative issues?	[ ]	[ ]	[ ]	[ ]	[ ]
Review or establish a strategic plan at least once a year?	[ ]	[ ]	[ ]	[ ]	[ ]
Review and establish a budget for your practice at least once a year?	[ ]	[ ]	[ ]	[ ]	[ ]
Evaluate the performance of employees at least annually?	[ ]	[ ]	[ ]	[ ]	[ ]
Evaluate the efficiency of operations on least once a year?	[ ]	[ ]	[ ]	[ ]	[ ]
Conduct meetings to discuss clinical issues?	[ ]	[ ]	[ ]	[ ]	[ ]
Evaluate the quality of services to patients at least once a year?	[ ]	[ ]	[ ]	[ ]	[ ]

Would you like the management in your main practice to become more or less formal?

Much more formal	More formal	No changes	Less formal	Much less formal	*Not Applicable*
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Please indicate who makes the following decisions in your practice.

Who makes the decisions in your main practice with respect to:	A receptionist with administrative duties	A nurse	A physician	Physicians as a group	An Office Manager	*Hospital, chronic care or regional administrator*
Taking on new physicians?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Hiring non-medical staff?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Setting the pay rates of staff?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Purchasing office supplies?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Purchasing medical equipment?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Selecting clinical services (i.e. lab services, x-rays, etc.)?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Facility financing decisions (i.e. renewing lease or mortgage)?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

Do you have sufficient influence over decisions made in your main practice setting?

Not Applicable	Far too little influence	Too little influence	The right amount of influence	Too much influence	Far too much influence
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

10. Career Satisfaction

Please indicate your level of satisfaction with the following aspects of your medical career

How satisfied are you with:	Very Dissatisfied	Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Satisfied	Very Satisfied
Your interactions and relationships with other physicians?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
The doctor-patient relationships derived from providing patient care?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
The diversity of patients you see (age, types of clinical conditions, etc)?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your success in meeting the needs of your patients?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your ability to access resources needed to treat your patients?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your capacity to keep up with advances in your clinical speciality?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your role in organizing treatment programs for patients in your community?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your interactions and relationships with nurses?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your interactions and relationships with health care administrators?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your authority to get your clinical decisions carried out?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your ability to control your work schedule?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your ability to keep responsibilities at work from intruding on your personal life?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your ability to maintain satisfying activities in the community (service, culture, church, etc.)?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your career advancement in medicine?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your earnings as a physician during your medical career?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
The way your medical practice is managed?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your social and leisure activities?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
Your medical career, considering your various roles and responsibilities?	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

How do you feel about your life as a physician?

Terrible	Unhappy	Mostly Dissatisfied	Equally satisfied & dissatisfied	Mostly Satisfied	Pleased	Delighted
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

11. Health Policy

Should health care continue to be funded by **publicly administered comprehensive** health insurance plans provided to all residents in each province and territory of Canada?

[ ] Definitely, the current system functions well
[ ] Probably, however, there are some problems in the current system that must be fixed
[ ] Maybe the problems in the current system are so great that other systems might be better
[ ] Probably not, other systems are likely to be superior to the current system
[ ] Definitely not, other systems are superior to the current system

To ensure accountability to their local region, **regional health boards/authorities** should exercise **greater financial control** over the funding of health care services.

Strongly agree	Agree	Agree slightly	Disagree slightly	Disagree	Strongly disagree	*Don't know*
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

To ensure national health care standards, the **Federal government** should exercise **greater financial control** over the funding of health care services.

Strongly agree	Agree	Agree slightly	Disagree slightly	Disagree	Strongly disagree	*Don't know*
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

2. Demographics

Main area of specialization

What is your age? ☐

☐ Female ☐ Male

Marital Status

☐ Single
☐ Married/Common Law
☐ Separated/Divorced
☐ Widowed
☐ Other_____

If living with a partner, how many days a week does that person work outside the home?

☐ On a full-time basis
☐ 3 or 4 days per week
☐ 1 or 2 days per week
☐ Less than 1 day per week

Do any dependent children live with you?

No ☐ Yes ☐

List the ages of ALL your dependent children

___,___,___,___,___,___,___

Do any dependent adults, excluding partner, live with you? ☐ *No* ☐ *Yes*

Ages of dependent adults

___,___,___,___

What issues should be covered in follow-up surveys?

Thank you for taking the time and effort to complete this survey. The results will be analysed and reported in broad groups. Your identity will be held in strictest confidence.

Appendix B – Model Reductions

Total Patient Visits / Week

Significant contributors, in order of individual contribution: Gender, Payment Method, Practice Size

Initial model → $Y = \beta_0 + \beta_1 Gender$

Adjusted $r^2 = 0.085$
$SSE_1 = 3515263.8$

Addition of Payment Method → $Y = \beta_0 + \beta_1 Gender + \beta_2 Pay$

Adjusted $r^2 = 0.152$
$SSE_2 = 3256791.1$
$MSE_2 = 3256.791$
$k = 1$
$n = 1003$
$p = 1$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,1000} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of payment method significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{3515263.8 - 3256791.1}{1}}{3256.791} = 79.3642 > F_{tab} = 3.84$$

Therefore, the addition of payment method to the model containing gender does significantly improve the model.

Addition of Practice Size → $Y = \beta_0 + \beta_1 Gender + \beta_2 Pay + \beta_3 PSize$

$SSE_1 = 3256791.1$
$MSE_1 = 3256.791$

Adjusted $r^2 = 0.162$

$SSE_2 = 3213427.5$
$MSE_2 = 3219.867$
$k = 1$
$n = 1002$
$p = 2$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,998} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of payment method significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{3256791.1 - 3213427.5}{1}}{3219.867} = 13.4675 > F_{tab} = 3.84$$

Therefore, the addition of practice size to the model containing gender and payment method does significantly improve the model. The best fit model for total patient visits is:

$$Y = \beta_0 + \beta_1 Gender + \beta_2 Pay + \beta_3 PSize$$

Patient Visits / Week – Regular Hours

Significant contributors, in order of individual contribution: Payment Method, Gender,

Practice Size

Initial model → $Y = \beta_0 + \beta_1 Pay$

Adjusted $r^2 = 0.090$
$SSE_1 = 2890745.7$

Addition of Gender → $Y = \beta_0 + \beta_1 Pay + \beta_2 Gender$

Adjusted $r^2 = 0.172$
$SSE_2 = 2627412.2$
$MSE_2 = 2627.412$
$k = 1$
$n = 1003$
$p = 1$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,1000} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of gender significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{2890745.7 - 2627412.2}{1}}{2627.412} = 100.2254 > F_{tab} = 3.84$$

Therefore, the addition of gender to the model containing payment method does significantly improve the model.

Addition of Practice Size → $Y = \beta_0 + \beta_1 Pay + \beta_2 Gender + \beta_3 PSize$

$SSE_1 = 2627412.2$
$MSE_1 = 2627.412$

Adjusted $r^2 = 0.193$
$SSE_2 = 2554848.6$
$MSE_2 = 2559.969$
$k = 1$
$n = 1002$
$p = 2$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,998} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of payment method significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{2627412.2 - 2554848.6}{1}}{2559.969} = 28.3455 > F_{tab} = 3.84$$

Therefore, the addition of practice size to the model containing payment method and gender does significantly improve the model. The best fit model for patient visits per week during regular hours is:

$$Y = \beta_0 + \beta_1 Pay + \beta_2 Gender + \beta_3 PSize$$

Patient Visits / Week – On Call

Significant contributors, in order of individual contribution: Gender, Practice Size, Age

Initial model → $Y = \beta_0 + \beta_1 Gender$

Adjusted $r^2 = 0.008$
$SSE_1 = 455888.43$

Addition of Practice Size → $Y = \beta_0 + \beta_1 Gender + \beta_2 PSize$

Adjusted $r^2 = 0.017$
$SSE_2 = 451478.16$
$MSE_2 = 451.027$
$k = 1$
$n = 1004$
$p = 1$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,1001} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of age significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{455888.43 - 451478.16}{1}}{451.027} = 9.7783 > F_{tab} = 3.84$$

Therefore, the addition of practice size to the model containing gender does significantly improve the model.

Addition of Age → $Y = \beta_0 + \beta_1 Gender + \beta_2 PSize + \beta_3 PAge$

$SSE_1 = 451478.16$
$MSE_1 = 451.027$

Adjusted $r^2 = 0.025$
$SSE_2 = 446941.27$
$MSE_2 = 448.286$
$k = 1$
$n = 1001$
$p = 2$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,997} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of practice size significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{450493.96 - 446941.27}{1}}{448.286} = 7.9251 > F_{tab} = 3.84$$

Therefore, the addition of age to the model containing gender and practice size does significantly improve the model. The best fit model for patient visits per week during on call is:

$$Y = \beta_0 + \beta_1 Gender + \beta_2 PSize + \beta_3 Age$$

Hours Worked / Week

Significant contributors, in order of individual contribution: Gender, Practice Size

Initial model → $Y = \beta_0 + \beta_1 Gender$

Adjusted $r^2 = 0.107$
$SSE_1 = 136690.63$

Addition of Practice Size → $Y = \beta_0 + \beta_1 Gender + \beta_2 PSize$

Adjusted $r^2 = 0.113$
$SSE_2 = 135846.22$
$MSE_2 = 135.711$
$k = 1$
$n = 1004$
$p = 1$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,1001} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of practice size significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{136690.63 - 135846.22}{1}}{135.711} = 6.2221 > F_{tab} = 3.84$$

Therefore, the addition of practice size to the model containing gender does significantly improve the model. The best fit model for hours worked per week is:

$$Y = \beta_0 + \beta_1 Gender + \beta_2 PSize$$

Patients / Hour Worked

Significant contributors, in order of individual contribution: Payment Method, Gender, Practice Size, Age

Initial model → $Y = \beta_0 + \beta_1 Pay$

Adjusted $r^2 = 0.076$
$SSE_1 = 1488.36$

Addition of Gender → $Y = \beta_0 + \beta_1 Pay + \beta_2 Gender$

Adjusted $r^2 = 0.086$
$SSE_2 = 1473.202$
$MSE_2 = 1.473$
$k = 1$
$n = 1003$
$p = 1$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,1000} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of payment method significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{1488.36 - 1473.202}{1}}{1.473} = 10.2906 > F_{tab} = 3.84$$

Therefore, the addition of gender to the model containing payment method does significantly improve the model.

Addition of Practice Size → $Y = \beta_0 + \beta_1 Pay + \beta_2 Gender + \beta_3 PSize$

$SSE_1 = 1473.202$
$MSE_1 = 1.473$

Adjusted $r^2 = 0.086$
$SSE_2 = 1468.823$
$MSE_2 = 1.472$
$k = 1$
$n = 1002$
$p = 2$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,998} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of payment method significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{1473.202 - 1468.823}{1}}{1.472} = 2.9749 < F_{tab} = 3.84$$

Therefore, the addition of practice size to the model containing payment method and gender does not significantly improve the model. Practice size should be excluded from the model.

Addition of Age → $Y = \beta_0 + \beta_1 Pay + \beta_2 Gender + \beta_3 Age$

$SSE_1 = 1468.823$
$MSE_1 = 1.472$

Adjusted $r^2 = 0.089$
$SSE_2 = 1461.335$
$MSE_2 = 1.467$
$k = 1$
$n = 1000$
$p = 3$

Tabulated F-Value = $F_{k,n-p-k-1} = F_{1,995} = 3.84$

Decision Rule = If calculated F-value < 3.84 cannot conclude that the addition of payment method significantly improves the model.

$$F_{calculated} = \frac{\frac{SSE_1 - SSE_2}{k}}{MSE_2} = \frac{\frac{1468.823 - 1461.335}{1}}{1.467} = 5.1043 > F_{tab} = 3.84$$

Therefore, the addition of age to the model containing payment method and gender does significantly improve the model. The best fit model for patient visits per hour worked is:

$$Y = \beta_0 + \beta_1 Pay + \beta_2 Gender + \beta_3 Age$$

Appendix C – Summary of Findings

Table A-C.1 – Summary of Findings

Output Measure / Dependent Variable	Differences within Independent Variables	Best Fit Model	R^2 for Best Fit Model (%)
Total Patients / Week	Gender: - Males > Females Age: - Females: 45-54 > 35-44; 55-64 > 35-44 - Males: none Payment Method: - Females: (>80% FFS) > (<20% FFS); (20-80%) > (<20% FFS) - Males: (<80% FFS) > (20-80% FFS) > (<20% FFS) Practice Size: - Females: Solo > 5+ Physicians - Males: none	Gender; Payment Method; Practice Size	16.2
Patients / Week – Regular Hours	Gender: - Males > Females Age: - Females: (<35) < 55-64; 35-44 < 45-54; 35-44 < 55-64; 55-64 > 65+ - Males: none Payment Method: - Females: (<80% FFS) > (20-80% FFS) > (<20% FFS) - Males: (<80% FFS) > (20-80% FFS) > (<20% FFS) Practice Size: - Females: Solo > 4 Physicians; Solo > 5+ Physicians - Males: none	Payment Method; Gender; Practice Size	19.3
Patients / Week – On Call	Gender: - Males > Females Age: - none Payment Method: - none Practice Size: - none	Gender; Practice Size; Age	2.5

Hours Worked / Week	Gender: - Males > Females Age: - Females: 35-44 < 45-54; 35-44 < 55-64; 55-64 > 65+ - Males: none Payment Method: - Females: none - Males: (>80% FFS) > (<20% FFS) Practice Size: - Females: Solo > 2 Physicians; Solo > 3 Physicians; Solo > 4 Physicians; Solo > 5+ Physicians - Males: none	Gender; Practice Size	11.3
Patients / Hour Worked	Gender: - Males > Females Age: - none Payment Method: - Females: (>80% FFS) > (<20% FFS); (20-80% FFS) > (<20% FFS) - Males: (>80% FFS) > (<20% FFS); (>80% FFS) > (20-80% FFS) Practice Size: - None	Payment Method; Gender; Age	8.9

Appendix D – Post Hoc Analysis – Solo vs. Group Practice

Table A-D.1 –Collapsed Practice Size Variable vs. Output - Females

t-test - Practice Size vs. Output - Females						
Measure	**Practice Size**				**Mean Difference (S-G)**	**P-Value**
	Solo (N=64)		**Group (N=462)**			
	Mean	**STD**	**Mean**	**STD**		
Total Patients	143.36	67.98	117.55	51.57	25.81	0.005
Patients During Regular Hours	134.69	63.12	105.70	46.40	28.99	0.001
Patients During Oncall	8.67	16.16	11.85	20.83	-3.18	0.159
Hours Per Week	46.53	11.98	40.46	11.93	6.07	0.000
Patients Per Hour	3.14	1.52	2.98	1.20	0.16	0.429

Table A-D.2 –Collapsed Practice Size Variable vs. Output - Males

t-test - Practice Size vs. Output - Males						
Measure	**Practice Size**				**Mean Difference (S-G)**	**P-Value**
	Solo (N=70)		**Group (N=407)**			
	Mean	**STD**	**Mean**	**STD**		
Total Patients	174.74	68.13	154.12	63.07	20.62	0.020
Patients During Regular Hours	162.44	62.46	138.14	57.01	24.31	0.003
Patients During Oncall	12.30	17.42	16.13	23.06	-3.83	0.110
Hours Per Week	50.70	10.52	49.09	11.31	1.61	0.245
Patients Per Hour	3.48	1.36	3.20	1.27	0.28	0.111

Appendix E – Power Calculations

In hypothesis testing, there are two types of potential error: 1) rejecting a null hypothesis when it *should not* be rejected; and 2) failing to reject a null hypothesis when it *should* be rejected. The first error has been called 'Type I error,' and is addressed through the employment of an α (alpha) value. This α is the amount of Type I error the researcher is willing to accept – in other words, the percentage of tests in which the researcher is willing to reject a null hypothesis that should not be rejected. In the present study, and in many other quantitative studies, the α chosen was 0.05. This means that the author was willing to risk a 'false positive' in 5 per cent of cases.[43]

Type II errors occur when the researcher fails to reject a null hypothesis that *should* have been rejected. This error is address through the use of a ß (beta) value; the percentage tests in which the researcher is willing to fail to reject a null hypothesis that should have been rejected. ß values range between 0.00 and 1.00. By subtracting ß from 1, the researcher can determine the 'statistical power' of the test. In other words, Power = 1 – ß. Most researchers strive for power levels of 0.80 or higher (in other words, ß of 0.20 or lower).43 This means that no more than 2 out of every 10 failures to reject the null hypothesis are incorrect.

The power of a statistical test, according to Hair et al, is a function of three things: 1) the sample size; 2) the alpha level chosen; and 3) the effect size of the test. In the present study, it is not possible to adjust the size of the sample *ex poste* – data has been collected and analyzed. The alpha level chosen was 0.05. The effect size, according to Hair et al, is a measure of the magnitude of a difference between groups. The more obvious the difference is, the larger the effect size, the smaller the difference, the lower the effect size.

Cohen developed a tool through which researchers could measure effect size when employing analysis of variance techniques:

$$d = \frac{m_1 - m_2}{\sqrt{MSE}} \tag{E.1}$$

Where d is the effect size which is equal to the difference between group means ($m_1 - m_2$) divided by the square root of the mean squared error identified by the ANOVA procedure. The resulting d value, according to Cohen, indicates the number of standard deviations between the two mean values being compared. Cohen's d values for the current study were presented in the comparative analysis tables in Section 4.

Pfaffenberger and Patterson[44] provide a method through which the required sample size can be estimated if the researcher knows the levels of alpha and beta they wish to employ, the standard deviation of their population, and the mean difference between the groups being compared:

$$n = \frac{\sigma^2 (z_{\alpha/2} + z_{\beta})}{d^2} \tag{E.2}$$

Where n is the required sample size to reach a power level of 1 – ß given an α and the standard deviation (σ). Here, (d) is the difference between group means. Given the nature of the present study, n is fixed and the analysis has been completed – ex ante adjustments can no longer be made. However, by rearranging the terms in the formula presented by Pfaffenberger and Patterson, one can isolate the ß value and perform calculations to determine the statistical power of the tests that have already been completed:

$$z_{\beta} = \sqrt{\frac{n \times d^2}{\sigma^2}} - z_{\alpha/2} \tag{E.3}$$

The formula requires the use of z-scores, which can be obtained from z-tables of standard normal cumulative probabilities available in most statistical textbooks. This procedure enables the researcher to ascertain the power levels achieved by the statistical techniques conducted.

In the present study, 235 category to category comparisons were made on the basis of gender (male vs. female), age (< 35 vs. 35-44 vs. 45-54 vs. 55-64 vs. 65+), payment method (<20% FFS vs. 20-80% FFS vs. >80% FFS), and group size (solo vs. two vs. three vs. four vs. five) and the five output measures (total patients, regular

patients, on call patients, hours worked, and patients per hour). Of these 235 comparisons, 31 saw the null hypothesis (that there would be no difference in output) rejected. Of the total 235 comparisons, 124 were deemed to have statistical power of 0.80 or greater. All of the comparisons for which the null hypotheses were rejected had statistical power of 0.80 or greater. Of the remaining 111 tests that did not have statistical power greater than 0.80, not a single one had an effect size (Cohen's d) greater than 0.3.

While an increased sample size may have resulted in the identification of more statistically significant differences, the relationship between effect size and statistical power suggests that most sample sizes were sufficient.

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